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IN THIS ISSUE:

Reflections on Creativity

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BATTELLE TECHNICAL REVIEW

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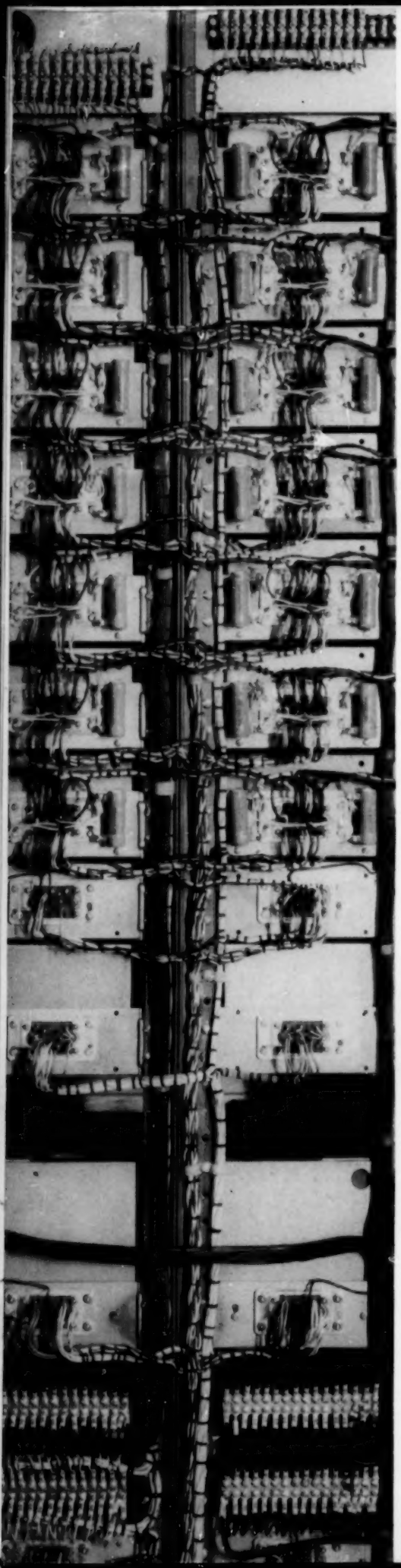

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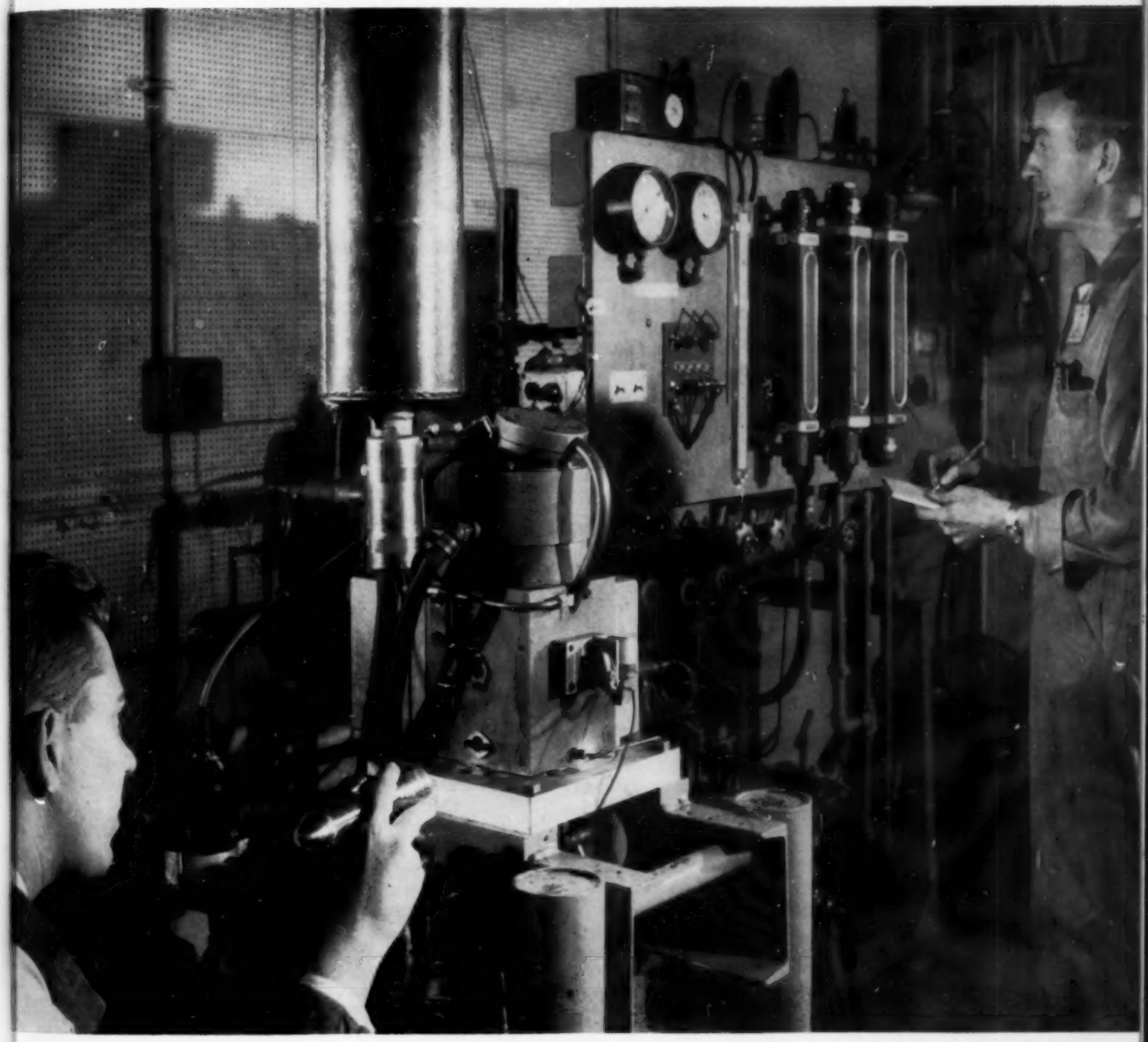
1a Battelle Technical Review Abstracts

Abstracts of articles and papers in a wide variety of technological fields from more than 1350 journals published throughout the world. Abstract selection largely reflects the primary areas of Battelle research.

Mounted on the stand in the foreground is a fuel-gas-fired free-piston engine. The Battelle-designed engine was developed for use in gas air-conditioning equipment.



FREE-PISTON ENGINE FOR AIR CONDITIONERS

VIGNETTE

METALLURGIST

PAUL D. FROST

The demand for improved high-temperature materials for high-speed aircraft and missiles and other high-temperature uses is a constant challenge to the metallurgist. To supply the need, he is developing new alloys of conventional metals. At the same time, Battelle metallurgist Paul D. Frost points out, many metals which were laboratory rarities or minor alloying elements only a few years ago are now being investigated for high-temperature applications. Today, research metallurgists are busy evaluating such metals as titanium, zirconium, molybdenum, rhenium, and tantalum, studying their characteristics, and developing methods for their treatment and fabrication.

Since joining Battelle in 1946, Paul has participated in and directed investigations on an impressive list of metals problems. He has been associated with such significant alloy development programs as magnesium-lithium-base alloys, titanium, aluminum, zirconium, and others. He supervised research which formed the basis for commercial heat-treating practice for titanium alloys and which also led to the discovery of the omega phase in such alloys. Paul guided pioneering studies that led to the first successful extrusions of titanium. He also participated in studies that revealed an omega phase in zirconium and led to successful heat-treating methods for the metal.

Holder of a number of patents, Paul has contributed numerous articles to metallurgical journals. He is also much in demand as a lecturer. A recent paper and lecture of Paul's, based upon the studies that led to improved heat treating of titanium, were the basis for his receiving the 1957 Metal Treating Institute Achievement Award.

After graduating from Rensselaer Polytechnic Institute with a bachelor's degree in metallurgical engineering, Paul was associated with Republic Steel Corporation's Buffalo plant where he was concerned with quality-control problems and production metallurgy. Later he joined the Curtiss-Wright (now Cornell) Aeronautical Research Laboratory as a research engineer. He combined metallurgical research there with teaching metallurgy at the Cornell Extension School in Buffalo.

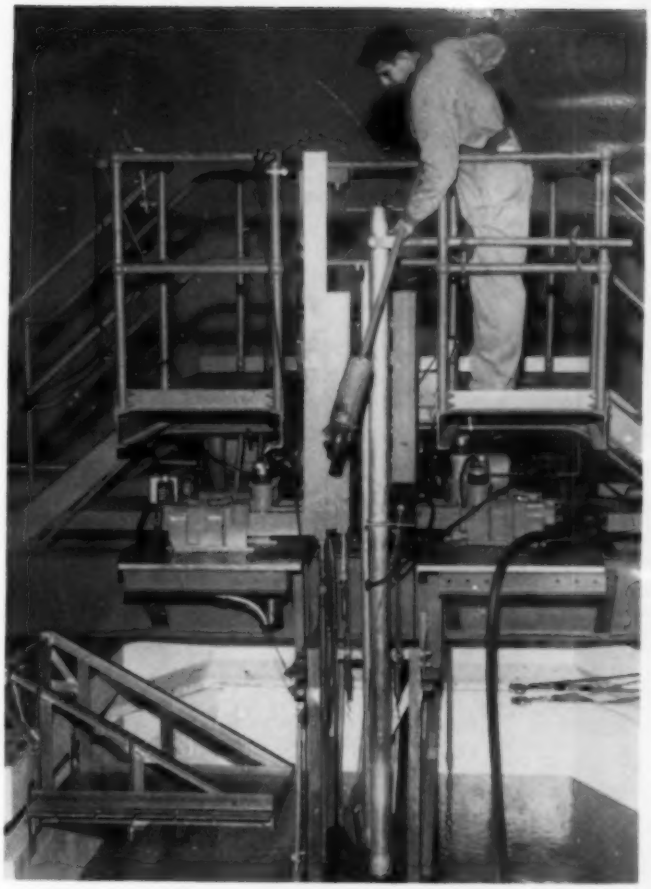
Paul participates in the activities of the Magnesium Association and is a member of its Technical Committee. He is active also in the American Society for Metals, The American Institute of Mining, Metallurgical, and Petroleum Engineers, the American Foundry Society, and the (British) Institute of Metals.

At home, much of Paul's, as well as his wife Ruth's, life is keyed to their teen-aged daughter and younger son. Paul is active in his church's affairs. When home-remodeling work does not interfere, he engages in sports activities.

Graft Polymerization

Graft polymerization is a promising method for producing plastics with unusual characteristics. The author reviews techniques of grafting monomers and points out the advantages of grafting by irradiation, the newest of the techniques.

by H. George Hammon



Lowering a "weazel tube" or capsule, which contains a polymer specimen for irradiation, into the pool of Battelle's research reactor. The specimen is placed close to the reactor core so that it will receive the fullest possible irradiation.

The past twenty years have provided us with plastics that are abundant, have widely varying properties, and are relatively inexpensive. The development of basic types of plastics has been only part of the story. Research has brought to plastics technology techniques for improving their properties and producing new materials with properties that were previously unavailable or not available in the desired combinations.

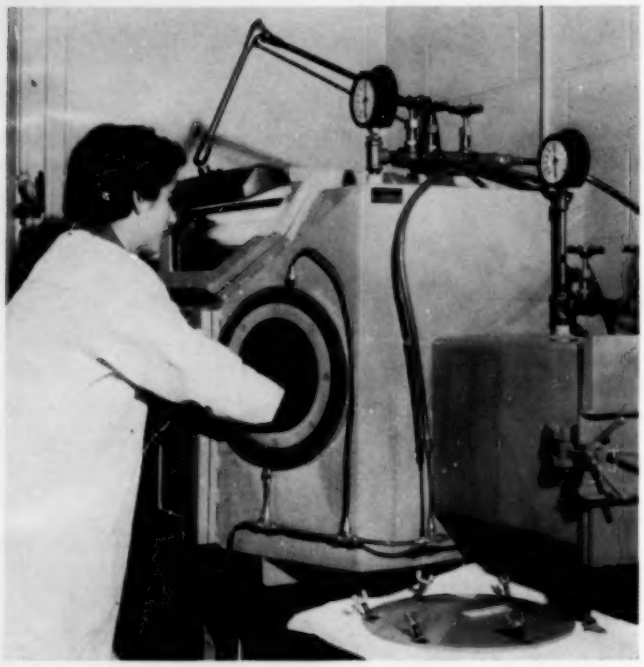
One of the most promising new methods for preparing plastics is "graft polymerization". The term "graft" was borrowed from horticulture. Like the horticulturalist who is able to graft apple scions to pear trees, the chemist can join chemically two or more dissimilar polymers.

Polymer Types

Plastics, more generally known to chemists as polymers, are high-molecular-weight organic compounds produced by the linking together of many small units called monomers. One of the principal types of polymers is created by linkage of monomers into straight chains of monomers; the other by the "cross-linking" of monomers in three-dimensional fashion. The straight chain, with or without branches of units, provides materials known as "thermoplastics". These may be repeatedly softened with heat and remolded. A typical polystyrene chain may contain as high as two thousand units. The cross-linked polymers are infusible and are called thermosetting resins. Bakelite, a three-dimensional phenol-formaldehyde polymer, is a good example of such a resin.

Polymers may be built of units of the same kind or of a combination of dissimilar monomers. The former are known as homopolymers, the latter are called copolymers. Several types of copolymers are illustrated on page 5. It will be noticed that simple copolymers may have either a regular, ordered sequence of the two types of polymers or the different polymers may be arranged in a random order.

In graft polymerization, however, one polymer forms a chain or backbone to which the second polymer attaches itself as branches. Graft polymerization is only now being introduced into plastics technology, although it has been known for years that grafting can be carried on by a number of methods including the utilization of free radicals (created by chemical and other means), ionic polymerization, and condensa-



Preparing polymer samples in inert atmosphere prior to irradiation. This practice is necessary in order to protect the free radicals which play an important part in grafting.

tion or addition reactions. Grafting by irradiation is a very recent discovery, not becoming generally known until some three years ago.

The properties of the graft copolymer will depend to a large extent on the number and length of the branches. Often polymers may be obtained with physical or chemical characteristics unobtainable by ordinary copolymerization methods. For this reason grafting can be used to create tailor-made polymers possessing certain desired properties. While ordinary copolymers may be expected to possess physical or chemical characteristics intermediate between those of polymers of each type of component, graft copolymers may possess characteristics similar to those of one of the pure components or entirely unique properties not found in the original components.

Grafting by Radiation—Induced Free Radicals

Graft polymerization by radiation may prove to be exceptionally valuable. It offers, for example, a means of chemically altering a preformed synthetic or natural polymer without changing its physical shape, and often without destroying many desirable properties. Thus, a hydrophilic surface, which serves as a conductor, might be grafted to a hydrophobic film or fiber to reduce the tendency of synthetic material to accumulate a static charge. The grafting of selected monomers to some of the newer synthetic fabrics may be the factor improving their receptiveness to dyes. Similar treatment of plastic films may improve their printability.

Many different sources of radiation may be used to initiate graft polymerization. Fission products or other artificially produced radioactive materials, as well as reactors, may be used. Other usable radiation includes X-rays and ultraviolet rays and that from Van de Graaf generators, resonant transformers, and linear accelerators.

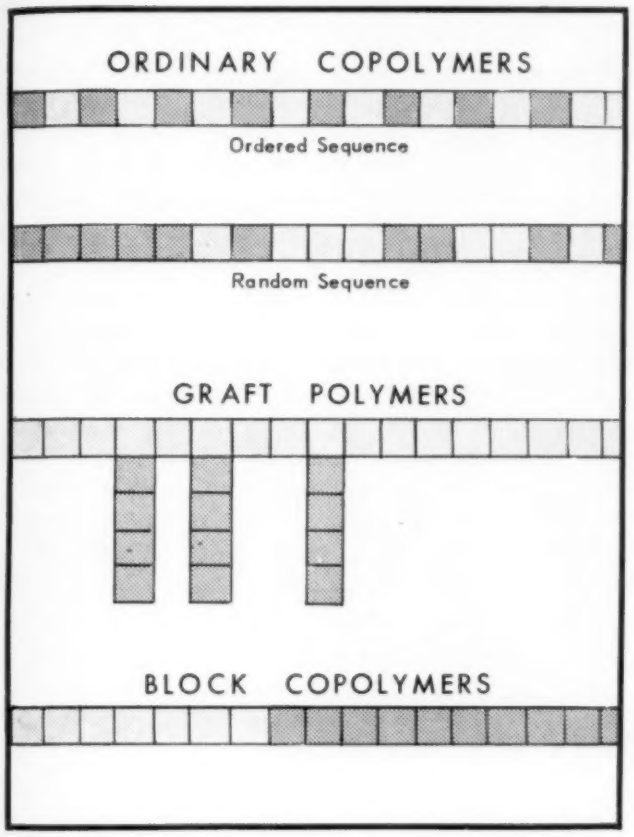
Grafting by irradiation is still largely in the laboratory stage, but some interesting materials have already been produced. The grafting of acrylonitrile to polyethylene reduces the swelling of the latter in aromatic hydrocarbons, raises its softening range from 110 to 160 C, and provides a surface excellent for adhesion to many polar materials such as cellophane. Small quantities of acrylic esters grafted to polyethylene, after hydrolysis, prevent the accumulation of static charges. Styrene-grafted polyethylene can be sulfonated to yield a cation-exchange membrane. Styrene grafted to the surface of Teflon improves the adhesion of other materials to Teflon by conventional adhesives.

Grafting by irradiation has been accomplished by two different methods. One has been referred to as "mutual irradiation grafting" and the other as "preirradiation grafting". In the mutual irradiation grafting method, a polymer is immersed, dispersed, or dissolved in the desired monomer and the two are irradiated together. For best results, the polymer should be very sensitive to radiation and the monomer should be relatively insensitive, otherwise homopolymer formed from the monomer may contaminate the graft polymer.

In preirradiation grafting, the polymer is irradiated in air, according to the technique developed by Adolphe Chapiro and colleagues. This results in the

Dr. Hammon, who is currently investigating graft polymerization by irradiation, has previously participated in studies of other polymerization techniques. Prior to his association with Battelle, he had been responsible for guiding research on foam polyeurethane materials as Assistant Director of Research of Hudson Foam Plastics Corporation. Earlier, he had directed studies of various foam plastics for Ivano, Inc. His work on plastics has led to three patents with four pending. The author received his Ph.D. in organic chemistry from The Ohio State University.

TYPES OF COPOLYMERS



formation of peroxide groups on the polymer. Subsequent heating of the polymer in the desired monomer results in the decomposition of the peroxide groups to form peroxy free radicals attached to the polymer, which initiates grafting of the monomer to these sites. Work at the Brookhaven National Laboratory, however, has shown that faster reactions may occur in the absence of oxygen. This type of preirradiation grafting would involve long-lived free radicals rather than the peroxide groups formed by irradiation in air. D. S. Ballantine has shown that these long-lived free radicals may persist in some plastics, in the absence of air, for six months or longer.

Other Methods of Free-Radical Initiation

Free-radical initiation of grafting can be done by means other than by irradiation. Vinyl monomers have been grafted to rubber by masticating rubber and the desired monomer on a mill in the absence of air. The shear ruptures the polymer chain and forms free radicals at the broken chain ends. Polymerization is then initiated at these sites, in the presence of the monomer.

Grafting may also be accomplished by modification of the usual polymerization procedures. Rubber may be dissolved in styrene monomer and the mixture polymerized with the aid of the usual peroxide initiators. During the polymerization, some of the styrene becomes grafted to the rubber. Similarly, in emulsion polymerization processes, one monomer (butadiene for example) may be polymerized first, the second monomer (let's say styrene) is added and the polymerization continued. Under these conditions much of the styrene can be grafted to polybutadiene. Graft polymers prepared by these methods may be used in molding resins and are reported to contribute considerably higher impact strength to the resin than simple blends of polymers in the same proportions. Graft copolymers of rubber and methyl methacrylate have improved tensile strength and fatigue resistance.

The term grafting has been used in this discussion in a generic sense, since the product in some cases may be a block copolymer. Block polymers, as shown in the chart, generally consist of chains of unlike polymers attached in more or less linear fashion. If the radical has been formed by breaking one of the side-chain bonds, including a carbon-hydrogen bond, then a graft copolymer will result. However, a main-chain rupture would leave radical sites at the ends of main-chain fragments and block copolymers would result.

Grafting by Condensation or Addition Reactions

The reaction of ethylene oxide with compounds containing "active" hydrogen, such as hydroxyl amino, amido, or carboxyl groups, is a familiar one, especially in the preparation of nonionic detergents. This same method has been employed to graft polyethylene glycol branches to such polymers as nylon and cotton. The grafted nylon retains the individual properties of the two species rather than the intermediate properties of a random copolymer. It retains its high softening point and resistance to solvents, but has the flexibility and hydrophilic nature of the polyethylene glycols.

Isocyanate-terminated polymers may also be reacted with active hydrogen-containing groups in such polymers as cellulose or nylon. If the polymer is terminated with an isocyanate group on one end only, a graft copolymer will result when it is reacted with the cellulose or nylon. If the isocyanate group is on both ends of the polymer, a cross-linked copolymer is obtained. In another procedure, unsaturated monoisocyanates such as allyl isocyanate are reacted with cotton. The pendant vinyl groups are then used as sites for vinyl polymerization and the chains are extended

to form graft copolymers. Similarly, acrylic or methacrylic acids have been reacted with cotton and the resulting attached vinyl groups used as sites for graft polymerization. Treatment of cotton by these procedures is said to improve shrink and crease resistance and may impart a glossy appearance and a different feel or "hand" to the product.

Block Grafting by Ionic Polymerization

Professor M. Szwarc at Syracuse State College of Forestry has introduced the interesting concept of "living" polymers. By carrying out an anionic polymerization in a non-acid solvent such as tetrahydrofuran, a polymer is formed that is not terminated, or "killed", in the usual manner. The polymer continues to grow as long as it has monomer "food". If the supply of monomer is exhausted, the growth is interrupted, although the "living" ends are potentially able to grow further if an additional amount of monomer is made available. Thus, interesting block or graft copolymers were prepared by allowing the initial polymerization to consume the first monomer. A second, different monomer was then added, and the polymerization continued. The polymers were terminated or "killed" by the addition of air or water.

In the few years devoted to research on graft polymerization, scientists have found many potential advantages to be gained from use of the technique. A number of patents have been granted in the field with more certain to follow in the next few years. The industry seems on the brink of commercial exploitation, and there already appears to be some commercial utilization of the technique in isolated cases.

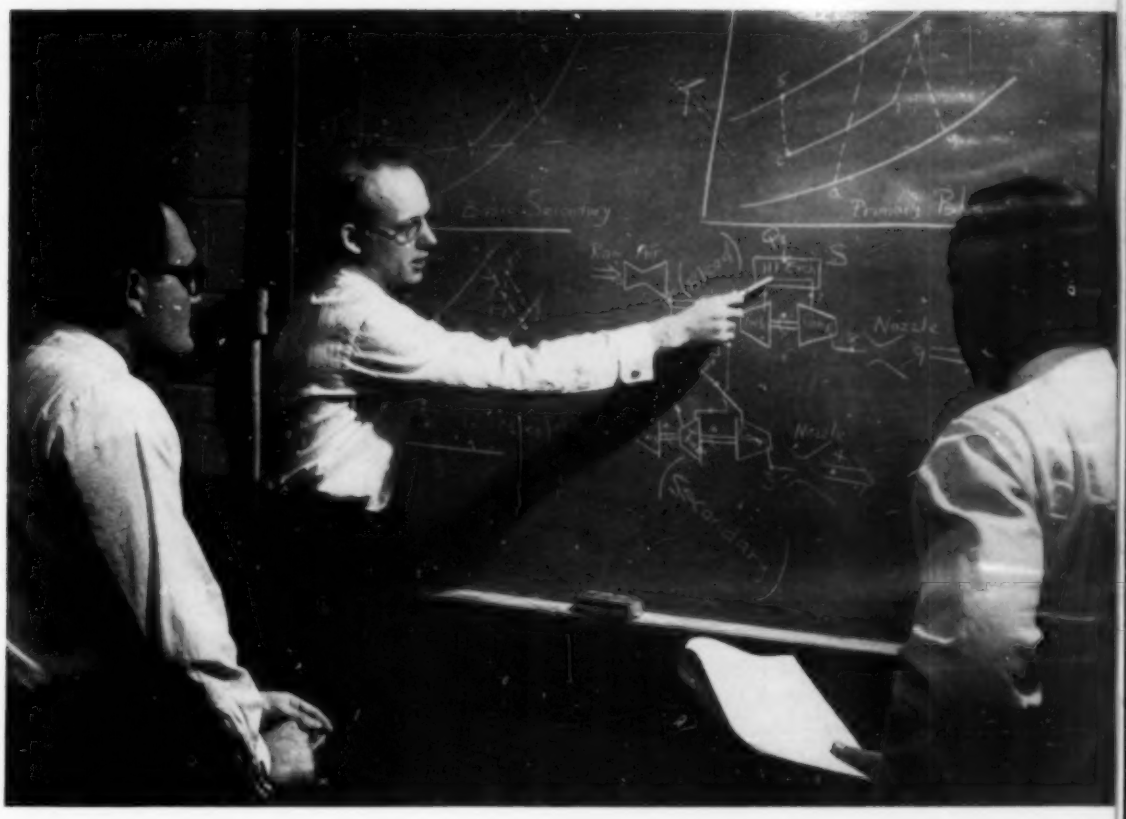
Graft polymerization is proving economically feasible in a number of applications. The development of improved processes of varied types is likely to reduce costs considerably and thus encourage the use of the technique. Where a graft polymer can be made by more than one method, the most economic will, of course, be preferred. For example, if a graft polymer could be made at moderate cost by polymerization techniques, there would be no point in utilizing expensive radiation procedures. On the other hand, the special advantages cited for grafting by irradiation assure it a place in plastics chemistry. The availability of less costly high-energy radiation will bring wider adoption of this special polymer-grafting technique.

HYPOTHESES FOR A HISTORY OF SCIENCE AND TECHNOLOGY

"*Hypothesis I*: In his pursuit of knowledge man has been primarily application (how) minded; in other words, he has sought concrete, material benefits. In general, he has concerned himself with theory (why) only when he has been slowed or stopped in his applicative efforts.

"*Hypothesis II*: In general, necessity is the mother of invention, but the operation of Hypothesis I is such that, occasionally, when the search for 'why' is faced, a completely unexpected result is obtained. This leads to a quantum 'jump' in our scientific knowledge and challenges our technologists to apply the new knowledge."

Joseph F. McCloskey
Case Institute of Technology



New concepts are usually originated through the joint efforts of a group of creative persons. The exchange of viewpoints activates each mind and fosters creativity. Once evolved . . .

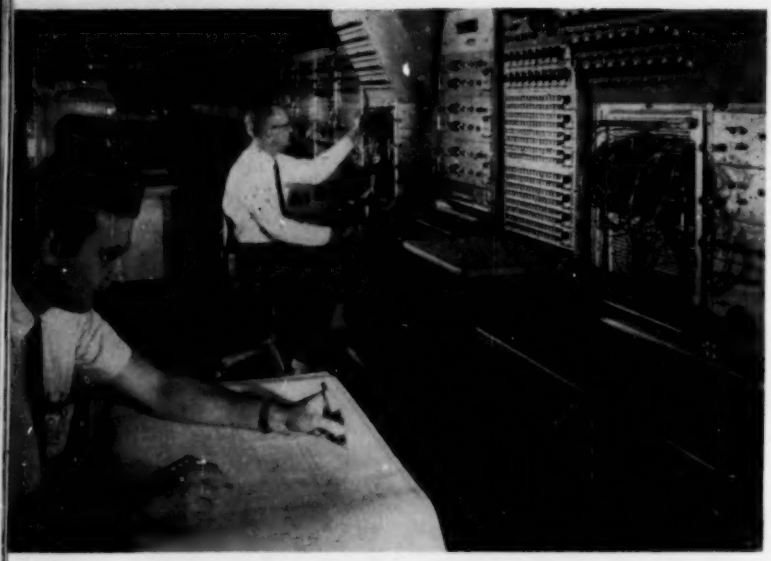
Reflections on Creativity

Both government and industry are seeking ways to enhance creativity in their research programs. The author suggests that organizations can increase creativity by attention to several important factors. These include selecting effective research personnel, providing a stimulating research environment, and assuring adequate financial support for promising developments.

by ROLLIN J. MCCRORY

AMERICAN SCIENCE and technology are being called upon to aid in the solution of at least two vital national problems. The first of these is concerned with creating the means for rapidly improving our military defenses. We have suddenly discovered that we are being pressed by other nations in certain technological fields important to our national security. The challenge thus faced by our scientists has been sharpened by the realization of the American people —and others—that the ability to create new ideas and to convert these ideas to sound concepts is not exclusive to one nation or group of nations. The urgency of the situation makes it imperative that our technological creativity be nurtured.

At the same time, scientists and technologists find themselves faced with the problem of helping to maintain America's economic strength. Individual companies and entire industries, as well as communities, are concerned about their economic security. A highly important factor in maintaining that security is the ability of industries to maintain and increase their share of the market through technological advances; this ability rests largely upon the effectiveness of the company's or industry's research programs.



. . . concepts require preliminary evaluation. If worthy . . .

Recognition of the significance of the contributions of scientists and technologists has led industrial organizations to give the most careful attention to their research efforts so that the best use may be made of the limited high-caliber scientific and technological manpower available.

Typical research and development programs are usually initiated after recognition that products superior in performance, cost, or function are needed. The desired product may be an earth satellite or a self-locking fastener. Within the framework of the need, ideas are created that may grow out of the results of original research, experience and techniques from other fields, and possibly, the ingenious combination of apparently unrelated elements. Before they can be classified as concepts worthy of further consideration, however, ideas must be critically reviewed and refined by analysis, experimentation, and partial development. This step often involves consideration of highly critical related problems without the solution of which the process or product may not be possible. After establishment of the concept it must undergo further refinement of function, performance, dependability, and durability so that it can be proved, in comparison with other concepts, to be an advantageous end-product. Finally, of course, comes the design of the product for ultimate use.

Conceptual Research

Although the detailed work required to convert a concept to a product is a major portion of most developments, there is a growing recognition of, and stress upon, the phases leading to the establishment of concepts. The realization is growing that the most significant advances in technology stem from these preliminary phases, and that the creation of new concepts is crucial in meeting the challenges growing out of our national defense and economic problems.

Increasingly, research centers are recognizing the technological value of stressing the development of concepts. The process of establishing pioneering concepts that substantially advance existing art or technology, may be properly called "conceptual research". Such research includes conceiving the idea, determining its feasibility, and finally, developing the concept to a point deemed worthy of final development.

As defined above, conceptual research has been effectively applied to problems of national security by establishments such as the laboratories of the National Advisory Council for Aeronautics. Thus, the development of the concept at NACA provided a technological advance which has resulted in airframe shapes that can fly at speeds exceeding Mach 2 (twice the speed of sound). With the advent of such hypersonic airframes, there arose a need for new concepts in aircraft power plants which would be effective at comparable speeds. Within the past several months, NACA has announced a new concept which will permit operation of turbo jet engines in the Mach 4 realm. Each of these pioneering concepts involved the application of the results of new research and of a fresh approach in combining pertinent developments to meet the need for hypersonic aircraft. The intensive "conceptual research" done at NACA has, of course, been applied to great effect in aircraft such as the B-58, F-104, and the Navy record-breaking Crusader.

Progressive American industries have also begun to adopt improved techniques for research on new concepts. An example is to be found in the research for the gas industry directed toward developing principles

At Battelle the author has contributed to and guided the creation of original conceptions in the fields of prime movers, machine design, and refrigeration. His interests are indicated by his participation in the thermodynamic analysis of new power cycles, the development of high-performance automotive and free-piston engines, and diverse studies ranging from radar antennae to aircraft cooling systems. Following his graduation from Purdue University, McCrory was associated with Fairbanks Morse and Company, where he was engaged in the development of a locomotive cooling system.

of gas air conditioning. The responsibility for this research was assigned to the American Gas Association and the study is intended to provide a broader base for gas utilization, particularly during the off-peak summer months. The organization of the research approach as planned by the AGA is a good example of the functioning of conceptual research. Two separate research groups were assigned the task of considering the adaptability of all known refrigerating methods to equipment utilizing gas as an energy source. The investigation also included a search for new approaches to gas air conditioning. After evaluating the feasibility of the many methods that came to light, a few were selected for preliminary development. Today, several attractive concepts are in prototype stages with feasibility and operating principles established. The "conceptual research" phases of the study have been largely completed and the proved concepts are nearing product design and development stage.

Experience with conceptual research has shown that the surest means of achieving productive research is to provide a sound research organization. There is no easy way or pat research formula which can, with any certainty be applied to an inept organization to assure that it will produce worthwhile results. Gaining a long-term return on the research investment involves, rather, the development of three intangible factors by organizations: (1) A research staff whose members will be stimulated by technological challenges; (2) An environment conducive to research productivity; and (3) A willingness to support promising research until its potentialities can be realized.

The Staff for Conceptual Research

Technical personnel can be broadly divided into two general groups. Members of one group, by virtue of attitude, interest, training, and experience, are more adept at detailed engineering primarily concerned with cost, styling, marketing, and production. This is much the larger of the two groups and its effectiveness is proved by the remarkable ability of American industries to produce large quantities of goods economically. The second group is composed of individuals who require the challenge and stimulation of being on the frontiers of technology, and who have the ingenuity, analytical ability, required knowledge, understanding, and daring to devise and develop new concepts. These attributes, plus an open mind, a fresh approach, and a refusal to be unreasonably restrained by past and often shallow experience, are more likely to yield the solution to pioneering problems than wide experience in how things used to be done.

The creation of ideas involves a mixture of individual genius and group interaction. Artistic, literary, and musical masterpieces are almost invariably the product of the genius, inspiration, and dedication of an individual. These same qualities must be possessed by scientists and technologists if they are to create new concepts. But scientific research requires an added quality—the ability of the individual to work closely with associates so that together they can create an involved technical concept beyond the ability of any one individual.

. . . they must be cast into tangible form, and . . .

Engineers and scientists with broad interests and capabilities described above must be assigned to working on tomorrow's problems. The selection of individuals with the needed qualities and their further development within the research group are the first major problems of those responsible for building a conceptual research staff.

Environment for Conceptual Research

Another critical problem is the need to encourage the growth of individual qualities and an environment of intellectual freedom—the freedom to "think big" without restraint or ridicule, and the freedom to utilize ideas from any source. Moreover, there must be receptiveness and respect by the directing group for radical, even revolutionary, ideas, because these often lead to the concepts that are needed. Although every idea must be realistically evaluated, such evaluation must be of a positive nature. The ill-considered negative response, ridicule, or the snap adverse judgment can do more to reduce the effectiveness of the creative research man than any other single factor.

The second essential for a healthy research environ-

. . . experimentally developed and proved in the laboratory.

ment is the freedom to communicate with any individual or source of possible ideas and to maintain contact with a diversity of technologies. The complexity of modern science requires that problems be exposed to the thinking of scientists from varied fields to permit a cross-breeding of ideas. To help implement this freedom, research organizations tend to congregate around intellectual centers such as Cambridge and Princeton where there is to be found the freest flow of ideas. The freedom of communication among scientists and technologists of diverse fields also in part explains the success of independent research organizations in the area of conceptual research.

An example of the success of one of the latter organizations is to be seen in a study seeking more efficient methods of drilling oil wells. It was a problem having a scope beyond the range of a single technology. This recent research program required the combined efforts and contributions of physicists, metallurgists, electrical and mechanical engineers, and geologists. The influence of these varied approaches resulted in a drilling technique which employs a magnetostrictive transducer to impart an axial vibration to the drill bit. Before the magnetostrictive technique could be successfully applied to down-hole drilling, varied technical problems from insulating the electrical leads from the action of mud and chips to filtering the vibratory motion from the drill string had to be met and solved. Doubling the drilling speed with this successful development did not just happen. It required imagination and daring to take a new and radically different tack. The end product, however, could not have been realized if the scope of the study had been limited to any single technology and if freedom of communication among diverse technologists had been absent.

Support of Research

The successful conclusion of a specific research problem can never be guaranteed, as those having responsibility for either supporting or conducting the research well know. Hence, the development of any given concept to a successful product is a risk undertaking. The military, for example, because of the importance to it of new, even radical concepts, is frequently prepared to accept high risk to find solutions for the problems with which it is faced. But industrial firms whose research must more than support itself, are more often concerned about limiting risk in their research programs. By careful selection of projects and vigorous support of those selected, companies can increase the probability of successful research programs. Of course, if conceptual research were easy, and its outcome predictable, the research investment would probably not be worthwhile because of lack of opportunity for competitive advantage.

During a pioneering research project, there is frequently a necessity to sustain research effort during frustratingly unsuccessful periods. Although management has the responsibility for continually evaluating research progress, it should realize also that the overcoming of sticky side problems in the course of a study is frequently necessary. A major corporation, which sponsored the development of a new and different portable power unit, exemplifies the wisdom of seeing a program through difficult periods. After a considerable amount of research expenditure it was necessary for the investigators to point out that the unexpectedly difficult research was not producing the anticipated results. The company for which the study was being prosecuted firmly determined that the research would be continued and even accelerated because careful evaluation had convinced its management that the potential return from the research justified its continuance. With such support the power unit was developed to a prototype stage. This promising development would not have been possible had the short-term discouragement and frustration caused a cessation of the research effort.

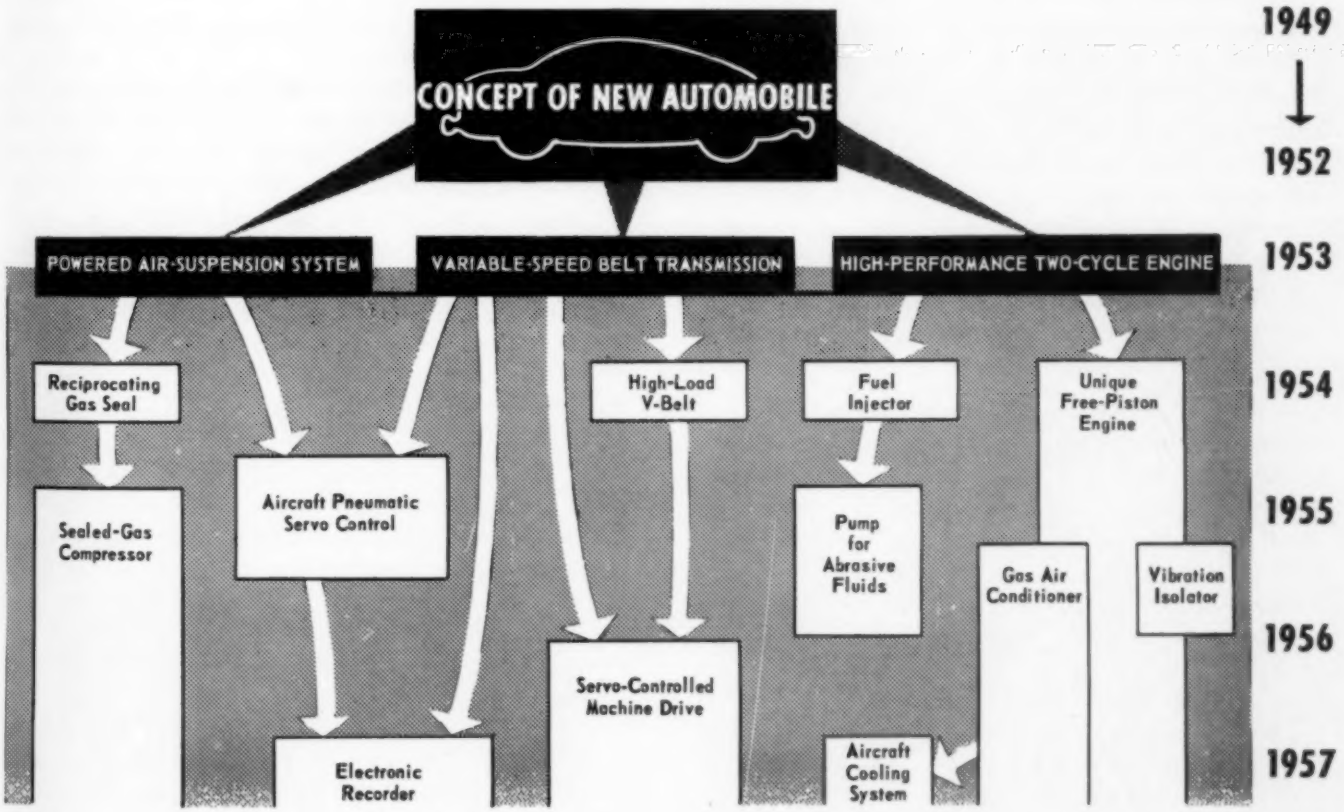
The growing practice of appointing scientists and technologists to policy-making positions in government and industry has important implications in bringing about such recognition and thus nurturing creativity in research. Such appointments have the effect of assuring those involved in research that their points of view and interests will be represented when the organization's decisions are made. This can be a pow-

erful factor in establishing a fruitful research environment.

One of the outstanding benefits of conceptual research is its provision of a basis for intelligent and selective progress—a choice of directions for further progress. One of the remarkable aspects of vigorously conducted research is that the most worthwhile results may lie outside the immediate research objective. Within the fruitful research environment, attention to a problem apparently limited to one field often produces results in other fields through the cross-breeding of ideas. A research group assigned the task of developing the concept of a "car of tomorrow" in 1949 found the study a gateway to a wide variety of research interests. The history of this research group from 1949 to 1957 is shown in the graph to have started with intensive research effort on the automobile. By 1953 it had become apparent that although the new concept was technically sound, the advanced features being created were not economically practical. Nevertheless, a powered air-suspension system, a variable-speed transmission, and a high-performance engine seemed to hold a promise of usefulness in a number of fields. At the present time, research which was initiated to create a new auto is continuing on direct but unrelated descendants which range from high-frequency voltage recorders to cooling systems for high-speed aircraft.

The possession of concepts such as these is of priceless value to any organization, the success of which depends upon advancing research. To government research organizations they provide bridges to new developments. To industries they provide a basis for selective diversification, a policy which is now so important to large industrial segments.

Experience with conceptual research has brought out certain important elements which are useful to government and industry in considering their research planning. Each study must be planned in the light of agreed-upon objectives and the particular research personnel assigned to it. Experience has taught that long-term success in research depends upon the acquisition and development of a staff with individual and group imagination, initiative, scope, and daring. With such a staff, the best research results can be obtained by providing a stimulating environment and adequate financial and organizational support. Under such conditions, a research group can be reasonably expected to provide striking results, often beyond the goals originally set up. The advanced concepts which such groups are capable of creating are indispensable to a growing economy and a secure defense.



New concepts in one area may form the basis for ideas useful in other fields. The chart above shows how conceptual research on an automobile led to new developments of value in a number of areas outside the automobile industry.

NOTES from BATTELLE

PHOSPHATE-BONDED CASTABLES

Conventional refractory castables — those bonded with a calcium aluminate cement— are largely limited in the temperature at which they can be used by the refractoriness of the cement rather than of the aggregate. For many years, ceramic technologists have been intrigued by the problem of developing a castable whose refractoriness is essentially that of the aggregate. One possibility has been to bond the castable with a phosphate, from which phosphorus would volatilize at a sufficiently high temperature and leave no fluxing ingredient.

After a study of phosphate bonding for castables, Battelle ceramic technologists Herbert D. Sheets, Jack J. Bulloff, and Winston H. Duckworth have reported the development of several interesting compositions. This research was undertaken with the aim of developing, for a particular application, compositions which:

1. Could be readily cast into rather complex, large shapes requiring a working time of 15 to 25 minutes and with low shrinkage and
2. Would be volume stable and maintain some strength at all temperatures up to the melting point of the material.

In their investigations, the technologists found that reactions between phosphoric acid and either the equipment or materials in the refractory grog liberated hydrogen which caused the specimen castables to bloat. To counteract this tendency, they experimented with inhibitors such as are used in metal pickling operations. Of several evaluated, one, a complex amine, eliminated the bloating. Moreover, the cured strength of bodies containing the inhibitor was higher than those without the inhibitor.

The investigators also sought to obtain a composition that would set without drying. They experimented with a number of additives and found that addition of about one per cent ammonium fluoride to the dry ingredients resulted in a set in 20 to 30 minutes. It was observed that the set did not occur when no inhibitor was present.

Through this technique, true refractory castables were prepared from alumina, mullite, beryllia, zirconia, and silicon carbide grog bonded with phosphoric acid or aluminum phosphate. They showed a minimum working time of 15 to 20 minutes, relatively low shrinkage, satisfactory volume stability, and adequate high-temperature strengths.

FEDERAL RESEARCH BUDGET

In the 1957 fiscal year, Federal Government expenditures for scientific research and development amounted to around $3 billion, according to the report *Federal Funds for Science*, VI, recently released by Alan T. Waterman, Director of the National Science Foundation. The $3 billion expenditure reflects an increase of about 20 per cent over the 1956 expenditure of $2.5 billion.

The report is the latest in a series on the Federal Government's research and development budget. It includes expenditures for conduct of research and development and for increase of R and D plant. The report also includes an analysis of the Government's financial obligations in terms of administering agencies, character of work, scientific fields, and organizations performing the work.

Twenty-three departments, offices, agencies, and establishments of the Federal executive branch administer funds for research and development. Of these, in the fiscal year 1957, the Department of Defense and the Atomic Energy Commission accounted for 85 per cent of the total funds. Along with these, six other agencies—the Department of Health, Education, and Welfare, the Department of Agriculture, The National Advisory Committee for Aeronautics, the Department of the Interior, the National Science Foundation, and the Department of Commerce—were responsible for all but one per cent of the R and D budget.

Of the funds obligated for research and development in 1957, more than 60 cents of every dollar was for development; less than 40 cents was obligated for research, both applied and basic. Basic research accounted for only eight cents. Of $964 million obligated for basic and applied research, physical sciences, including engineering, claimed 67 per cent; life sciences, 29 per cent; and social sciences, four per cent.

Thirty-five cents of each Federal R and D dollar for basic and applied research and development went to profit organizations, 14 cents to educational institutions, 48 cents within the Federal Government, and three cents to other institutions.

EQUIPMENT FOR IN-PILE STUDIES

The designing of experimental equipment required for studies involving the irradiation of solid or liquid samples calls for great care and planning. This is especially true when intensive irradiation in a nuclear reactor is involved.

Based upon their experience with the Battelle research reactor, Institute chemical engineers David J. Daniels, Milton C. Schroeder, Dennis D. Foley, and Robert B. Filbert, Jr. have pointed out the special problems involved in such irradiation studies. These problems include:

1. The need for mechanical and biological safety;
2. The need to protect the costly reactor from damage of any sort;
3. The limited space available in high-intensity radiation zones; and
4. Radiation hazards and reactor safeguards specifications that must be satisfied.

As a means of satisfying these requirements, the chemical engineers have guided a program leading to the development of a "torpedo" or in-pile unit for safer, more effective irradiation studies. The torpedo has a disposable inner section for containing the required chemical equipment and reusable plug section for containing the necessary service lines and electrical leads, which also provides radiation shielding and mechanical support.

The torpedo itself is designed to fit closely into the reactor beam tube. This feature, together with internally spiralled conduits, prevents radiation from streaming through the beam tube and torpedo into the working area. The typical torpedo is about nine feet long and weighs about 700 pounds.

COTTON GIN RESTUDY

A search for improved methods and equipment to gin cotton is now being conducted by a team of technologists at Battelle. The work is being conducted by the Institute under the sponsorship of the United States Department of Agriculture, Howard C. Davis, head of the Battelle team, reports.

"The fact that ginning methods have not changed essentially in the 160 years since Eli Whitney invented his gin may suggest that there is no way ginning can be basically improved", Davis observed. "On the other hand, after 160 years, perhaps it is time for an organized search to discover if there are better ways to gin cotton. With emphasis now on growing longer staple cotton, the problem is even more important, we believe."

The one-year study includes a search of technical literature to find out what has been suggested previously for improved ginning and visits to various plants manufacturing gin equipment. Beyond this, the Battelle team will critically evaluate a number of ideas that have been generated among its members. Davis pointed out that the team has a great deal of freedom in making suggestions for improvements in ginning. Their suggestions may range from specific mechanical improvements on conventional gin equipment to completely new concepts for ginning. "For instance", Davis said, "we are even considering the use of ultrasonic vibration or of nuclear radiation to aid in the separation of seed from the cotton fiber."

The Battelle technologist emphasized that the research team does not propose to work out details of new equipment or methods for ginning cotton at this time. Its current job is simply to evaluate the many ideas that are uncovered in the course of the present one-year study.

SHELLAC AND POLYMERS

New and improved polymers have many potential applications, one of which is the field of liquid waxes. The use of such materials to replace or augment natural and synthetic waxes has been increasing steadily. At the same time, excellent properties of the polymers have tended to obscure the added advantage to be gained by including refined shellac in liquid floor-wax formulations.

Battelle coatings technologists Benson G. Brand, Ralph W. Bird, Jr., and Ernest R. Mueller recently conducted a preliminary investigation to determine the effect of refined shellac on the film properties of the newer polymeric materials being used in the organics industry today. They report that they studied the films deposited by solutions of various polymeric materials containing no shellac as well as shellac concentrations of 25, 50, and 75 per cent.

The resulting data led to several interesting observations. (1) Refined shellac has very good compatibility with various types of polymeric materials including acrylic, vinyl, styrene-butadiene, polyethylene, polystyrene, alkyd, polyamide, hydrocarbon, and epoxy resin emulsions. (2) An optimum concentration of shellac exists for most polymers, a concentration that will give the greatest amount of change in the polymer's properties. (3) One cannot predict the effect of adding refined shellac to a specific polymeric material by the effect of its addition to any other specific material of the general class. Thus, of eight types of acrylic polymers studied, for any individual property,

a slightly different effect was obtained when refined shellac was added to each polymer.

The investigation indicated that refined shellac can be expected to improve leveling, removability, film continuity, gloss, and adhesion. The outstanding improvements were obtained with polystyrene and polyethylene.

* FILLER WIRES FOR WELDING

The increased use of high-strength, low-alloy steels in the production of aircraft and missile components has created a demand for welds capable of meeting the rising service requirements that are accompanying aircraft and missile advancement. In many cases, it is advantageous to use inert-gas tungsten-arc and inert-gas consumable-electrode processes for welding such steels. However, improved filler wires are needed to make better welds possible. Some of the difficulties to be overcome are (1) porosity, (2) weld-metal cracking, (3) inadequate response to heat treatment, (4) inadequate strength of heat-treated weld joints, and (5) insufficient weld-metal toughness.

Wright Air Development Center asked Battelle to study the problem of improving filler wires for welding SAE 4130, 4140, and 4340 steels. Institute welding technologists Herbert W. Mishler, Raeman P. Sopher, and Perry J. Rieppel directed the study. They report that the investigation was divided into two phases—first, the evaluation of available commercial filler wires, and second, the development and evaluation of experimental alloy filler wires. Their prime target was two filler wires for welding each of the three steels.

The technologists report that for each steel, they developed one filler wire of a composition similar to the base steel and at least one wire with a dissimilar composition. Sound, crack-free welds, heat treatable to 200,000 psi, were deposited under a high degree of restraint with these filler wires. The best results were obtained by using the wires with compositions similar to the base material, although satisfactory welds were made at most of the strength levels with the dissimilar filler wires.

* Alexander Finlay has been appointed chief of Battelle's electrical engineering division. He has been closely associated with the Institute's work on automatic electrical controls and instrumentation. His research activities have ranged from studies on automatic control systems for machine tools to the development of telemetering systems for "down-hole" data transmission in connection with oil wells.

Writings by STAFF Members

Advances in Nuclear Engineering, v. I. Pergamon Press, 1957, contains the following writings by staff members:

Pilot-Plant Studies on Nonaqueous Leaching of Western Ores. D. D. Foley, W. A. Meeley, and R. B. Filter, Jr., pp. 33-40.

A pilot plant was constructed and operated successfully to demonstrate an HCl-acetone process for extracting U. The process is described by material and equipment flow-sheets. A recovery of 90 to 95 per cent was obtained during short periods of operations. Solvent losses and upgrading of product are discussed.

The Economic Background for the Competitive Development of Nuclear Power. Harlan W. Nelson and W. R. Keagy, Jr., pp. 210-219.

An analysis is made of the projected future demand for electric energy in the United States, together with the factors of mineral fuel availability, reserves, distribution, and energy costs. Technical developments and expectations for the future in terms of costs and efficiencies of conventional thermal generating plants are discussed. Future expectations for nuclear power are examined against this background.

Advances in Nuclear Engineering, v. II. Pergamon Press, 1957, contains the following writings by staff members:

Radiation Stability Studies on Binary Uranium Alloys. G. D. Calkins, J. E. Gates, A. A. Bauer, and F. A. Rough, pp. 272-281.

A screening study covering 5, 7, and 10 weight per cent Mo-U, 3, 5, 10, and 15 weight per cent Zr-U, and 4.5 weight per cent Cr-U alloys indicated that the U-10 weight per cent Mo alloy, when irradiated in the retained-γ condition, possesses the greatest radiation stability. In general, radiation stability increases with alloy content. Heat treatment has a marked effect.

The Effect of Oxygen on Zirconium-Uranium Epsilon-Phase Alloys. H. A. Saller, F. A. Rough, and A. A. Bauer, pp. 228-233.

The stability of the intermediate ϵ phase of the Zr-U system was established. Pertinent data are summarized and the Zr-U constitutional diagram presented. Oxygen was found responsible for the decomposition of the ϵ phase to the α-U and α-Zr phases. Ternary Zr-U-O alloy behavior is discussed.

Journal of Metals, v. 9, sec. 2; *American Institute of Mining, Metallurgical, and Petroleum Engineers, Transactions*, v. 209, October 1957, contains the following writings by staff members:

Effect of Heat Treatment on the Hardness and Microstructure of U-Ti Alloys. David L. Douglass and Lyle L. Marsh, Jr., pp. 1260-1267.

The hardness and microstructure may be varied over wide ranges by suitable heat treatment. Quench-temper or isothermal treatments were particularly effective. The over-all response to heat treatment was dependent upon the phases present during solution treatment. Results are interpreted in terms of the phase diagram.

Creep of Al-Cu Alloys During Age Hardening, pp. 1182-1189.

High-purity polycrystalline alloys of Al with 1 to 4 per cent Cu were tested in creep over a temperature range of 200 to 540 C. Hardness, X-ray, and tensile data supplemented the creep results. Starting with alloys in the quenched, single-phase condition, creep tests were performed both within the single-phase and two-phase region of the equilibrium diagram.

Evaluation of Transport Integrals for Mixed Scattering and Application to Galvanomagnetic Effect. A. C. Beer, J. A. Armstrong, and I. N. Greenberg. *Physical Review*, v. 107, ser. 2, September 15, 1957, pp. 1506-1513.

The Johnson-Whitesell evaluations of the conductivity integrals for mixed scattering were extended over larger ranges of magnetic field and impurity scattering parameters to allow their application to the high-mobility semiconductors. Values are given for the first thermoelectric integral.

Electrical Resistivity and Thermoelectric Potential of Rhenium Metal. Gordon B. Gaines and Chester T. Sims. *American Society for Testing Materials, Preprint No.* 75, 1957, 10 pp.

An equation is derived for the resistivity of Re with an impurity content of approximately 0.006 per cent. The thermoelectric potentials generated by Re-Mo, Re-W, and Re-Ta junctions were measured over the temperature range from 870 to 2490 C. The first two show promise as thermocouples up to 2600 C in neutral or reducing atmosphere.

Polymerization of Some Fluorine-Containing Olefin Oxides. F. B. Jones, P. B. Stickney, L. E. Coleman, Jr., D. A. Rausch, and A. M. Lovelace. *Journal of Polymer Science*, v. 26, October 1957, pp. 81-88.

All of the polymeric products obtained from 1,1,1-trifluoro-2,3-butylene oxide were liquids of a relatively low molecular weight. The highest molecular weight polymers were obtained using $FeCl_3$, $AlCl_3$, and BF_3, and attempts were made to determine the relative polymerizability of other, more highly substituted, fluorinated olefin oxides. These were 1,1,1-trifluoro-2,3-pentylene oxide, 1,1,1-trifluoro-2,3-isopentylene oxide, 1,1,1,2,2,3,3-heptafluoro-4,5-hexylene oxide, 1,1,1 - 2,2,3,3 - heptafluoro-4, 5-heptylene oxide, and 1,1,1,2,2,3,3-heptafluoro-4,5-isoheptylene oxide.

Behaviour of Inverted Propane-Hydrogen Sulphide Flames at the Blow-off Limits. P. F. Kurz. *Combustion and Flame*, v. 1, September 1957, pp. 257-263.

At the lean limit propane appears to contribute its proportionate share to the stability of the mixed fuel, whereas the burning of H_2S is inhibited in the presence of propane. At rich blow-off, H_2S appears to inhibit the burning of propane in all mixtures, and when the fuel mixture contains more than 50 vol. per cent H_2S the component fuels are mutually inhibiting.

Permeability of Rubber to Organic Liquids. William J. Mueller. *Rubber Age*, v. 81, September 1957, pp. 982-987.

Describes work undertaken to obtain a general picture of some factors which affect the permeability rate. Using combinations of three test temperatures, seven organic liquids, and five types of synthetic rubber cured to optimum cure, it was found that permeability increased logarithmically with temperature for every rubber-liquid combination, and permeability was proportional to the square of the solubility of the liquid in the rubber. This permits estimation of the permeability rate under new conditions from existing permeability or solubility data.

Members of the Battelle staff are authors of the recently published articles and books listed on these pages. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

Protective Organic Coatings for Steel. Louis J. Nowacki and E. R. Mueller. *American Iron and Steel Institute, Preprint*, 1957, 13 pp.

A general survey designed to give some insight into the makeup of paints, the variety of coating materials that are available, and how paints differ in type and end use.

Cold Extrusion of Titanium. A. M. Sabroff, O. J. Huber, and P. D. Frost. *Product Engineering*, v. 28, Mid-October, 1957.

Fluoride-phosphate coating in combination with an oil-graphite MoS_2 lubricant is used to forward extrude Ti. Lubricant prevents galling and seizing and produces a smooth surface finish. Extruded stock exhibits as high as 60 per cent increase in strength with adequate ductility.

Heat Transfer by Radiation from Flames. A Summary of the Work of the International Flame Research Foundation. R. A. Sherman. *ASME, Transactions*, v. 79, November, 1957, pp. 1727-1741.

The variables studied were the type of fuels oils or coke-oven gas, rate of heat input, type and rate of supply of atomizing agent, type of burner, excess of air, type and amount of carbureting agent for gas, and temperature of the combustion air. Of these, the C/H ratio of the oil and gas fuels and the mixing conditions most markedly affect the emissivity and radiation.

Effect of Grinding Conditions and Resultant Residual Stresses on the Fatigue Strength of Hardened Steel. L. P. Tarasov, W. S. Hyler, and H. R. Letner. *American Society for Testing Materials, Preprint No.* 65, 1957, 18 pp.

Fatigue limit was investigated as a function of the residual stresses generated in flat test bars by longitudinal surface grinding, the experimental variables being wheel hardness, grinding fluid, and unit down-feed. For good commercial grinding conditions the limit was the same as that obtained under gentle grinding. Severe grinding caused a decrease of about 13 per cent. Cyclic stressing did not reduce the magnitude of the residual stresses.

Leather-Finish-Adhesion Test. Victor G. Vely, Nicholas D. Gallagher, and Maynard B. Neher. *American Leather Chemists Association, Journal*, v. 52, November 1957, pp. 622-633.

Three new heat-setting adhesives have been found which greatly widen the scope of the finish-adhesion test. A mixture of polyamides is applicable to nearly all shoe upper leathers. A vinyl chloride copolymer adheres to lacquer and upholstery leather finishes. The third new adhesive is an epoxy-based cold-set compound which adheres to practically all shoe upper leathers. A vinyl chloride copolymer adheres to lacquer and upholstery leather finishes. The third new adhesive is an epoxy-based cold-set compound which adheres to practically all shoe upper leathers without heat or special equipment.

What's Ahead in Semiconductors. Robert Willardson. *Military Electronics*, v. 4, October 1957, p. 16 + 4 pages.

Appraises the present situation in semiconductors, discusses new materials and their properties, and assesses the outlook for the future. While Ge, Se, and Si are currently well known, such intermetallics as InP, GaAs, and AlSb promise to be strong challengers after more research. Surveys applications in conversion of light energy, infra-red optics and detectors, low and high temperature electronics, and thermistors. Data on 19 semiconductors are tabulated.

Importance of Research to Industry. J. Homer Winkler. *Printing Equipment Engineer*, v. 88, October 1857, p. 39 + 3 pages.

To meet competition, a continuing search for new materials, methods, and equipment is necessary. Companies in the packaging field are urged to seriously consider the utilization of contract research facilities which offer a wide range of services.

WORLD-WIDE ABSTRACTS

in the FIELDS of

1a	Aeronautical Engineering
3a	Agriculture
4a	Biochemistry and Biophysics
8a	Ceramics and Concrete
10a	Chemical Engineering
12a	Chemistry—Analytical
15a	Chemistry—Inorganic and General
16a	Chemistry—Organic
21a	Chemistry—Physical
26a	Coatings
27a	Control Systems, Computers, and Systems Engineering
28a	Electrical Engineering
30a	Electrochemistry
31a	Electronics
36a	Engineering Economics
36a	Fluid Mechanics
37a	Food Technology
38a	Fuels and Combustion
38a	Geology, Geophysics, Mineralogy, and Mining Engineering
40a	Graphic Arts
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41a	Information—Preparation and Dissemination
41a	Instrumentation
42a	Lubrication and Friction
43a	Mechanical Engineering
44a	Metallurgy
45a	Metals—Corrosion
46a	Metals—Extraction and Refining
48a	Metals—Finishing, Polishing, and Cleaning
48a	Metals—Foundry Practice
49a	Metals—Heat Treatment
50a	Metals—Mechanical and Physical Properties
53a	Metals—Mechanical Working
54a	Metals—Metallography, Transformations, and Structures
58a	Metals—Powder
58a	Nondestructive Testing and Quality Control
59a	Nuclear Physics, Nucleonics, and Radiation
65a	Operations Research and Management Engineering
65a	Ore and Materials Beneficiation
66a	Physics
68a	Plastics
70a	Pollution and Wastes
71a	Rubber and Elastomers
72a	Space Heating and Conditioning
72a	Textiles, Fibers, Leather, and Paper
73a	Welding and Joining
75a	Miscellaneous

BATTELLE Technical Review ABSTRACTS

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

1 Some Effects of Kinetic Heating on the Stiffness of Thin Wings. A Preliminary Investigation of Thermal Stresses on the Torsional and Flexural Stiffness of Thin Solid Wings. S. L. Kochanski and J. H. Argyris. *Aircraft Engineering*, v. 29, Oct. 1957, p. 310-318.

The main investigation is based on the small deflection theory, but the scope of the analysis for torsion is extended to cover the effects of large deformations.

2* Ram-Air Cooling Systems for Aircraft Generators. Richard M. Moroney. *Applications and Industry*, 1957, no. 32, Sept., p. 217-221.

3 Evaporative Cooling System for Electronic Components. *Automotive Industries*, v. 117, Oct. 1, 1957, p. 61 + 2 pages.

Details of an airborne evaporative cooling system to protect electronic equipment inside aircraft or missiles from temperatures up to the 800 F of Mach 5 flight.

4* The Application of Ultra High Tensile Steel to the Design of a Modern Undercarriage. G. F. W. McCaffrey. *Canadian Aeronautical Journal*, v. 3, Oct. 1957, p. 263-272.

Steel with an ultimate tensile strength of 260,000 to 280,000 psi. was required.

5* Some Aspects of Helicopter Icing. J. R. Stallabrass. *Canadian Aeronautical Journal*, v. 3, Oct. 1957, p. 273-283.

6* Use of Non-Metallic Materials at High Temperatures. W. J. Strang. *Engineer*, v. 204, Sept. 20, 1957, p. 417-419.

Comprehensive review of the elements and compounds available for use in very high performance aircraft liable to be raised to high temperatures by kinetic heating and by the power units.

7 The Jet Aircraft of the World. William Green and Roy Cross. 176 p. 1957. Hanover House, Garden City, New York. (TL709 G82jh Over.)

Over 600 photographs illustrate and describe aircraft built and flown to date. Includes some design and performance data.

8 Skin Temperatures of a Satellite. Craig M. Schmidt and Arnold J. Hanawalt. *Jet Propulsion*, v. 27, Oct. 1957, p. 1079-1083.

For a nonrotating cylindrical shell with one end pointing earthward, the nominal limits of skin temperatures are −200 and +400 F.

9 The Transient Downwash Resulting From the Encounter of an Airfoil With a Moving Gust Field. Norman P. Hobbs. *Journal of the Aeronautical Sciences*, v. 24, Oct. 1957, p. 731 + 8 pages.

10 The Drag Coefficient of Very High Velocity Spheres. A. J. Hodges. *Journal of the Aeronautical Sciences*, v. 24, Oct. 1957, p. 755-758.

Measurements of velocities of two sizes of spheres were used to calculate the drag coefficient in the range Mach 2.2 to 9.7. At Mach numbers from 4 to 10 the drag coefficient is nearly constant and equal to 0.359.

11* Atmospheric Drag on the Satellite. R. Jastrow and C. A. Pearse. *Journal of Geophysical Research*, v. 62, Sept. 1957, p. 413-423.

Drag results from collisions with neutral air particles and from losses associated with the passage of a charged sphere through an ionized medium.

12 Systems—Satellites—Space. John M. Slater and Jack M. Wuerth. *Military Electronics*, v. 4, Oct. 1957, p. 24-27.

Contribution of electronics and controls to current accomplishments. Reviews problems and components.

13 Strain Gauge Balances for Wind Tunnels. An Outline of Practice in the United Kingdom. J. R. Anderson. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 5, Feb. 1956, 67 p. (TL565 Ag11r Contin.)

Includes descriptions of 12 particular balances.

14 Some Strain Gage Balances Used in French Wind Tunnels. P. Rebuffet. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 6-T, Feb. 1956, 64 p. (TL565 Ag11r Contin.)

(Translated from the French.) A review of the load-measuring devices, based on strain gages, used in recent years in French wind tunnels, brings out the prominent use of dynamometric analyzing elements. The strain gages used in the balance elements, appropriately grouped, are inserted into Wheatstone bridges which constitute simple algebraic operators.

15 Special Types of Internal Strain Gage Balances. T. L. Smith. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 7, Feb. 1956, 11 p. (TL565 Ag11r Contin.)

Details of a three-component balance with special design to give small interaction of normal forces on drag, a four-component balance for measuring Magnus forces on spinning models, a dynamic balance for the measurement of damping in pitch, and a balance for giving front and rear normal force designed for long slender bodies.

16 Special Applications of Strain-Gage Balances Used in the Supersonic and Hypersonic Wind Tunnels at the U. S. Naval Ordnance Laboratory. James R. Lightfoot and Charles E. White. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 8, Feb. 1956, 13 p. (TL565 Ag11r Contin.)

Purpose, functional description, and operation of the balance for spinning models, the aerodynamic damping balance, and the temperature-controlled balance.

17 Mechanical Design and Fabrication of Strain-Gage Balances. Raymond M. Hansen. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 9, Feb. 1956, 14 p. (TL565 Ag11r Contin.)

18 Development of Half-Model Wind Tunnel Balances. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 10, Feb. 1956, 35 p. (TL565 Ag11r Contin.)

Design and operational experiences. In all balances, strain gage transducers of the bonded or unbonded type are used for measurement of forces and moments.

19 A Note on a Half-Model Strain-Gauge Balance. N. C. Lambourne. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 11, Feb. 1956, 7 p. (TL565 Ag11 Contin.)

Equipment is designed for the measurement of four components; normal force, longitudinal force, pitching moment, and rolling moment on half models.

20 Problems Involved in Precision Measurements With Resistance Strain Gages. Keith H. McFarland and John Dimeff. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 12, Feb. 1956, 17 p. (TL565 Ag11r Contin.)

Electrical, thermal, and mechanical errors which may affect the accuracy of resistance wire strain-gage measurements. Corrective measures.

21 Evaluation and Calibration of Wire-Strain-Gage Wind-Tunnel Balances Under Load. Raymond M. Hansen. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 13, Feb. 1956, 17 p. (TL565 Ag11r Contin.)

22 (French.) Measuring and Recording Measurements on an Aerodynamic Strain Gage Balance. **Mesure et enregistrement des mesures sur les balances aérodynamiques a jauges a fil résistant.** M. Bassière. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 14, Feb. 1956, 19 p. (TL565 Ag11r Contin.)

A suitable recorder is combined with a coding device enabling the measurements to be noted or recorded on punched cards (or teletype).

23 Elevated Stagnation Temperature and Strain Gauge Balances in the Instrumentation of a Supersonic Wind Tunnel. G. P. Tonkin. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 15, Feb. 1956, 52 p. (TL565 Ag11r Contin.)

A wire and ceramic gage which can be stored in plain grid form is used.

24 Inspection Techniques Applied to the Metrology of Aerodynamic Models. H. T. Hill. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 24, Feb. 1956, 20 p. (TL565 Ag11r Contin.)

Methods of inspection; types of equipment; measurement of the leading edge and of waviness; three-dimensional automatic model measuring machine.

25 Tire-Runway Braking Friction Coefficients. Malvin N. Gough, Richard H. Sawyer, and James P. Trant, Jr. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 51, Feb. 1956, 20 p. (TL565 Ag11r Contin.)

The problem of obtaining adequate friction coefficients for use in determining the stopping distances of aircraft in landings. Methods and instrumentation for obtaining friction-coefficient data from full-scale airplane landings. Details of a friction-measuring cart to be towed over surfaces of interest.

26 Techniques for Testing Models of VTOL and STOL Airplanes. John P. Campbell. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 61, Aug. 1956, 31 p. (TL565 Ag11r Contin.)

27 Some Comments on High-Lift Testing in Wind Tunnels With Particular Reference to Jet-Blowing Models. A. Anscombe and J. Williams. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 63, Aug. 1956, 30 p. (TL565 Ag11r Contin.)

Suitable size of model; methods of feeding compressed air into models without affecting balance readings; general testing techniques.

28 The Flight Simulator in Aircraft Control and Design. W. J. G. Pinsker. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 71, Aug. 1956, 31 p. (TL565 Ag11r Contin.)

Possibilities of simulating manually controlled flight; principal types of flight simulators; importance of realistic visual and physical flight impressions.

29 The Determination of Aileron Effectiveness. R. R. Duddy. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 73, Aug. 1956, 8 p. (TL565 Ag11r Contin.)

Compares the aileron effectiveness derivative derived from flight measurements with the results of wind tunnel tests and estimates.

30 Notes on the Ground-Run of Jet-Propelled Aircraft During Take-Off and Landing. Guiscardo S. Alias. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 82, Aug. 1956, 34 p. (TL565 Ag11r Contin.)

By dividing the ground-run distance by a "basic" horizontal distance, a ratio is obtained which may be used to analyze the separate effects of various factors. This method is applied to ground-run distances on an inclined runway to examine the possibility of using sloping bare ground or a part of a main road suitably prepared as a "one-way strip" for landing or take-off.

31 Some Correlations of Flight-Measured and Wind-Tunnel-Measured Stability and Control Characteristics of High-Speed Airplanes. Walter C. Williams, Hubert M. Drake, and Jack Fischel. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 62, Aug. 1957, 11 p. (TL565 Ag11r Contin.)

32* (English.) **On the Two-Dimensional Compressible Flow Over a Thin Symmetric Obstacle With Sharp Shoulders Placed in an Unbounded Fluid and in a Choked Wind Tunnel.** Ken-ichi Kusukawa. *Physical Society of Japan, Journal*, v. 12, Sept. 1957, p. 1031-1041.

Pressure distributions over the surface of several symmetric profiles with sharp shoulders are calculated by this model flow method.

33* (English.) **On the Compressible Flow Over a Slender Body of Revolution With a Flat Base Placed in an Unbounded Fluid and in a Choked Wind Tunnel.** Ken-ichi Kusukawa. *Physical Society of Japan, Journal*, v. 12, Sept. 1957, p. 1042-1048.

34 Steel Castings in Air Frames. S. K. Hodgson. *Precision Metal Molding*, v. 15, Oct. 1957, p. 37-38.

Steel still finds its place in aircraft construction.

35 Rockets, Missiles, and Space Travel. Willy Ley. Rev. Ed. 528 p. 1957. Viking Press, New York. (TL782 L59roc.2)

Historical review of developments and trends in Germany and U. S.

36 A Theoretical Study of the Aerodynamics of Slender Cruciform-Wing Arrangements and Their Wakes. John R. Spreiter and Alvin H. Sacks. *U. S. National Advisory Committee for Aeronautics, Report* 1296, 1957, 31 p. (TL521 Un3r Vis.)

Basic ideas of slender-body theory are reviewed and equations are developed for the pressures, loadings, and forces on slender cruciform wings and wing-body combinations.

37 A Thermal System for Continuous Monitoring of Laminar and Turbulent Boundary-Layer Flows During Routine Flight. Norman R. Richardson and Elmer A. Horton. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4108, Sept. 1957, 25 p. (TL570 Un3t)

Detection is based on the difference in rate of heat transfer to a turbulent boundary layer as compared with that to a laminar boundary layer. The detectors, which consist of insulated resistance-thermometer gages cemented to the wing surface, combine the functions of heating and temperature measurement.

38 Theory of Aircraft Structural Models Subject to Aerodynamic Heating and External Loads. William J. O'Sullivan, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4115, Sept. 1957, 48 p. (TL570 Un3t)

The adequacy of an aircraft structure to withstand simultaneously the external loads and aerodynamic heating encountered in supersonic flight is examined by means of a structural model. By dimensional analysis it is shown that a structural model can be built which has the required similitude with respect to flow of heat through it, thermal stresses and deformations, and stresses and deformations due to external loads.

39 Wind-Tunnel Investigation at Low Speeds to Determine Flow-Field Characteristics and Ground Influence on a Model With Jet-Augmented Flaps. Raymond D. Vogler and Thomas R. Turner. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4116, Sept. 1957, 48 p. (TL570 Un3t)

40 Investigation of Heat Transfer From a Stationary and Rotating Conical Forebody. Robert S. Ruggeri and James P. Lewis. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4093, Oct. 1957, 30 p. (TL570 Un3t)

Experimental convective heat transfer was determined for a conical forebody (15° half-angle) for free-stream velocities up to 400 ft. per sec., rotational speeds up to 1200 r.p.m., angles of attack of 0 and 6°, and for heating conditions of uniform surface temperature and uniform heater input power density.

See also: **555** (telemetering in Earth satellites); **565** (aircraft flight control system); **572** (telemetering for interplanetary flight); **733** (satellite tracking receiver); **805** (orbital behavior of Earth satellite); **852** (translations of aeronautical literature); **857** (accelerometer design); **938** (stainless steel for aircraft); **1118** (machining of aerodynamic models).

AGRICULTURE

41* Hercules Shows Toxaphene Controls Boll Weevil in Louisiana. *Agricultural Chemicals*, v. 12, Oct. 1957, p. 33 + 1 page.

42* The Gibberellins. Curt Leben and E. F. Alder. *Agricultural Chemicals*, v. 12, Oct. 1957, p. 36 + 3 pages.

Progress report on properties, mode of action, and future prospects.

43 (English.) **Contribution to the Knowledge of Copper as a Plant Nutrient.** Frank A. Gilbert. *Agrochimica*, v. 1, Mar. 1957, p. 136-151 + 3 plates.

Research on the effect of added Cu in the soil indicated that yield responses may be obtained even in soils with no apparent Cu deficiency. Both soluble and insoluble forms may be used. Copper leaches very slowly, even in sandy soils, and residual effects in mineral soils last for several years. There is little danger of toxicity from fertilizer containing as much as 1% of Cu.

44 Changes in the Organic Acid Composition of Wheat Leaves Infected With the Leaf Rust Fungus. Richard C. Staples. *Boyce Thompson Institute, Contributions*, v. 19, July-Sept. 1957, p. 1-18.

A comparison was made of the changes in dry weight, respiratory activity and organic acid content of healthy and leaf-rust infected leaves of Thorne wheat in the period 8 to 23 days after the seeds were sown while uredinial pustules were developing.

45 The Organic Acid Composition and Succinoxidase Activity of the Uredospore of the Leaf and Stem Rust Fungi. Richard C. Staples. *Boyce Thompson Institute, Contributions*, v. 19, July-Sept. 1957, p. 19-31.

46 Nematocidal Properties of 2,4-Dichlorotetrahydrothiophene-I,I-Dioxide (PRD). Paul H. Schuldt and Henry Bluestone. *Boyce Thompson Institute, Contributions*, v. 19, July-Sept. 1957, p. 63-75.

47* (Russian.) On the Problem of Obtaining New Morphological Characteristics in Plants, and of Fixing Them Hereditarily. **K voprosu o poluchenii novykh morfologicheskikh priznakov u rastenii i vozmozhnosti ikh nasledovaniia.** F. F. Leisle. *Doklady Akademii Nauk SSSR*, v. 115, no. 1, July 1, 1957, p. 183-185.

Morphological changes were studied in *Specularia speculum* A.D.C. It was confirmed that the characteristics could be inherited, and in the third generation became more sharply defined.

48 Food From Fungi. Frank A. Gilbert and Radcliffe F. Robinson. *Economic Botany*, v. 11, Apr.-June 1957, p. 126-145.

If and when economic conditions and technological advances become favorable, fungi may some day be significant in furnishing human food through their protein-synthesizing capacity. The yeast, *Torulopsis*, has already been utilized on a commercial scale in several countries. Molds and other microorganisms can be of great value in utilizing the food energy of materials now discarded as waste because they are not in a form suitable for human consumption.

49 Determination of Small Quantities of 2,3,4,5-Bis(Δ²-Butenylene)Tetrahydrofurfural(Repellent R-11) in Milk. P. E. Toren, L. D. Goodhue, W. R. Kirkham, and D. E. Howell. *Journal of Agricultural and Food Chemistry*, v. 5, Oct. 1957, p. 749-753.

The insect repellent was tested for its appearance in milk, when used as a spray for dairy cattle. Analysis of milk samples throughout the treatment period failed to show the presence of any of the repellent within the sensitivity of the method, which was 0.1 p.p.m.

50 Effect of 8-Years Fertilizer Treatment of the 'Protein-Nitrogen' Content of Four Cropped Soils. A. H. Cornfield. *Journal of the Science of Food and Agriculture*, v. 8, Sept. 1957, p. 509-511.

Protein-nitrogen, organic carbon, and total nitrogen contents of four soil types are compared with values for similar unfertilized soils. Loam soil showed no significant differences in these values, but with sandy loam, sand, and chalky sandy soils the three values were significantly lower in unfertilized than in fertilized soils.

51 Studies of Spray Deposits. III. Factors Influencing the Level of 'Run-Off' Deposits of Copper Fungicides. E. Somers. *Journal of the Science of Food and Agriculture*, v. 8, Sept. 1957, p. 520-526.

The deposits retained by artificial and leaf surfaces sprayed to beyond 'run-off' have been investigated for Bordeaux, Burgundy, and cuprous oxide sprays, both with and without supplements. The level of deposit found was not influenced by increased spraying beyond the "run-off" stage.

52 Iron Chelates in Plant Nutrition. C. Bould. *Journal of the Science of Food and Agriculture (Supplement)*, v. 8, 1957, p. s1-s5.

Work on chelating agents indicates that they may act as plant growth promoters.

53 Aspects of Molybdenum as an Essential Nutrient for Higher Plants. E. J. Hewitt. *Journal of the Science of Food and Agriculture (Supplement)*, v. 8, 1957, p. s6-s14.

Effect of Mo supply on ascorbic acid, sugar, and enzyme metabolism.

54 Role of Trace Metals in the Nitrogen Metabolism of Plants With Special Reference to Micro-Organisms. D. J. D. Nicholas. *Journal of the Science of Food and Agriculture (Supplement)*, v. 8, 1957, p. s15-s25.

Molybdenum, Cu, Fe, Mn, V, and W are studied.

55 The Incidence and Control of Cobalt Deficiency Under Varying Soil and Pasture Conditions in Connemara, Co. Galway. L. B. O'Moore. *Journal of the Science of Food and Agriculture (Supplement)*, v. 8, 1957, p. s105-s112.

Malutritional syndromes in cattle and avoidance by systematic control of grazing areas.

56* Effect of Crop, Crop Residues, Temperature, and Moisture on Soil Fungi. S. K. Menon and Lansing E. Williams. *Phytopathology*, v. 47, Sept. 1957, p. 559-564.

It appears that the crop plant is a decisive factor influencing soil mycofloras. Therefore, the use of crop sequences is an effective and practical method of control.

57* Effect of Certain Fungicides on *Sclerotium Rolfsii* in the Soil. D. V. W. Abeygunawardena and R. K. S. Wood. *Phytopathology*, v. 47, Oct. 1957, p. 607-609.

A number of commercially available fungicides were tested for their ability to kill sclerotia in soil and to control disease under greenhouse conditions.

58* Molybdenum as a Plant Nutrient. X. Some Factors Affecting the Activity of Nitrate Reductase in Cauliflower Plants Grown With Different Nitrogen Sources and Molybdenum Levels in Sand Culture. M. I. Candela. E. G. Fisher, and E. J. Hewitt. *Plant Physiology*, v. 32, July 1957, p. 280-288.

59* Kinetics of Growth Inhibition by Herbicides. R. E. Frans, E. F. Lind, and W. E. Loomis. *Plant Physiology*, v. 32, July 1957, p. 301-307.

60* The Substitution of Complexing Substances for Boron in Plant Growth. John Skok. *Plant Physiology*, v. 32, July 1957, p. 308-312.

Several complex-forming elements including Sr, Al, and Ge were found to alleviate boron-deficiency symptoms temporarily and to increase growth of sunflower seedlings significantly in the absence of boron.

61* Effect of Selenium in Preventing Exudative Diathesis in Chicks. E. L. Patterson, R. Milstrey, and E. L. R. Stokstad. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, Aug.-Sept. 1957, p. 617-620.

The interactions of Se and vitamin E are evaluated.

62* Absorption of Sulfur Dioxide From the Atmosphere by Cotton Plants. Ralph A. Olsen. *Soil Science*, v. 84, Aug. 1957, p. 107-111.

Sulfur-35 sulfate was used in the nutrient solution. Over 50% of the S in S deficient plants was apparently absorbed from the atmosphere.

63* Our Growing Wood Supply. *Tappi*, v. 40, Sept. 1957, p. 38A + 7 pages.

Through proper care and management, our forests are growing more wood than we are using for the first time in many years.

See also **203** (caking of fertilizers); **244** (estimation of vanadium in plants); **285** (analysis of plant material); **336** (tobacco extracts).

BIOCHEMISTRY AND BIOPHYSICS

64* (English.) Some Results of Radio-Iodine Diagnostic Tests for Thyroid Function. D. Brinkley, J. L. Haybittle, and K. J. Plested. *Acta Radiologica*, v. 48, July 1957, p. 33-51.

All the tests (including the conversion ratio at 48 hrs.) give little help in distinguishing between hypo- and euthyroid patients, except insofar as an uptake below 20% is strong evidence of myxoedema.

65* (English.) Early Effects of Whole Body Irradiation on Cholinesterase Activity in Guinea-Pigs' Blood, With Special Regard to Radiation Sickness. Johan Lundin, Carl-Johan Clemedson, and Arne Nelson. *Acta Radiologica*, v. 48, July 1957, p. 52-64.

Guinea-pigs suffered a loss of cholinesterase activity in plasma amounting to about 30% during the first two days after whole body irradiation with 400 r.

66 Advance in Radiobiology. Proceedings of the Fifth International Conference on Radiobiology. George Carl de Hevesy, Arne Gunnar Forssberg, and John D. Abbatt, editors. 503 p. 1957. Oliver and Boyd, London. (QH652 In8)

Includes the report of the discovery that transplantation of actual cells of bone marrow or spleen allows good recovery in animals after what would have been a lethal dose of irradiation, and demonstrates the breakdown of the normal immune response by heavy doses of irradiation. Many other aspects are contained in the 68 papers presented.

67 Some Particle Scattering Factors for Rods With Inhomogeneous Mass Distributions. Application to the Molecular Configuration of Myosin. Alfred Holtzer and Stuart A. Rice. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4847-4851.

A general expression is applied to the particular case of the muscle protein myosin, which had previously been shown to be a linear aggregate of three rod-like sub-units, two of which are identical.

68 Deformation of Deoxyribonucleate. I. Titration and Optical Absorption Studies of the Effect of Temperature, Ionic Strength and *p*H on DNA Structure. Edward L. Duggan, Vincent L. Stevens, and Benjamin W. Grunbaum. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4859-4863.

69 Synthesis of Steroidal Methylene Compounds by the Wittig Reaction. Franz Sondheimer and Raphael Mechoulam. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 5029-5033.

70 Steroids. LXXXVIII. A New Synthesis of Desoxycorticosterone Acetate and of 16-Dehydro-Desoxycorticosterone Acetate. J. Romo, G. Rosenkranz, and Franz Sondheimer. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 5034-5036.

71 Synthesis of Potential Anticancer Agents. IX. 9-Ethyl-6-Substituted-Purines. John A. Montgomery and Carroll Temple, Jr. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5238-5242.

Synthesis from 6-chloro-9-ethylpurine, prepared by reaction of 5-amino-4,6-dichloropyrimidine with ethylamine and cyclization of the resulting 5-amino-6-chloro-4-ethylaminopyrimidine to the purine by the use of diethoxymethyl acetate.

72 The Indazole Analog of Serotonin. C. Ainsworth. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5245-5247.

Preparation of 3 β-aminoethyl-5-hydroxyindazole dihydrochloride together with some preliminary pharmacological findings.

73 Investigations in Heterocycles. I. Cyloalkeno[d]-Thiazolin-2-ones and Their Analgetic Properties. George DeStevens, Alice Frutchey, Angelina Halamandaris, and Heino A. Luts. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5263-5270.

Preparation, properties, and pharmacology. 2,3,5,6-Tetrahydro-3-methyl-4H-cyclopentathiazolin-2-one, was found to be an effective analgetic.

74 Theory of Protein Titration Curves. I. General Equations for Impenetrable Spheres. Charles Tanford and John G. Kirkwood. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5333-5347.

75 Studies on the Structure of Nucleic Acids. XI. The Roles of Heat and Acid in Deoxyribonucleic Acid Denaturation. Liebe F. Cavalieri and Barbara H. Rosenberg. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5352-5357.

Before denaturation begins there are some H bonds which are reversibly broken and healed. When a critical number of bonds are cleaved, denaturation sets in. This number depends on the temperature, ionic strength, and solvent system.

76 Near Infrared Spectra of Compounds With Two Peptide Bonds and the Configuration of a Polypeptide Chain. VI. Further Evidence of the Internal Hydrogen Bonding and an Estimation of Its Energy. San-Ichiro Mizushima, Takehiko Shimanouchi, Masamichi Tsuboi, and Tetsutaro Arakawa. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5357-5361.

Near infra-red spectra of acetylsarcosine N-methylamide and acetyl-N-methyl-DL-norleucine N-methylamide were measured in CCl_4 and $CHCl_3$ solutions.

77 The Annular Nitrogen of Pyridine as a Determinant of Immunologic Specificity. Alfred Nisonoff and David Pressman. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5565-5572.

The combination of rabbit antibodies homologous to the 3-azopyridine and ozobenzene haptenic groups with various substances of related configuration was investigated.

78* Amino Acid Requirements of Adults. May S. Reynolds. *American Dietetic Association, Journal*, v. 33, Oct. 1957, p. 1015-1018.

A review of current knowledge of the essential amino acid requirements of adult men and women.

79 Stability of *d*-α-Tocopherol Alone, in Solvents, and in Methyl Esters of Fatty Acids. H. J. Lips. *American Oil Chemists' Society, Journal*, v. 34, Oct. 1957, p. 513-515.

Study of the behavior of tocopherol in simple systems. Stability varied with the stability of the medium and the concentration of tocopherol.

80 An Investigation of the Incompatibilities of Quaternary Ammonium Germicides in Compressed Troches. I. The Adsorption of Cetylpyridinium Chloride and Benzalkonium Chloride by Talc and Kaolin. Nicholas H. Batuyios and E. A. Brecht. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Sept. 1957, p. 524-531.

Talc and kaolin gave the same type of curves with both compounds; they differed only in adsorptive capacity.

81 Enzymatic Decomposition of Digitalis Glycosides. Ole Gisvold and S. E. Wright. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Sept. 1957, p. 535-538.

The separation and identification of glycosides was helped by a new temperature-insensitive paper chromatography.

82 Antimicrobial Properties of a Series of β-Piperidinopropiophenones and Related Derivatives. H. J. Florestano, M. E. Bahler, and A. D. Chandler. *American Pharmaceutical Association, Journal (Scientific Ed)*, v. 46, Sept. 1957, p. 539-542.

Data include comparison of antifungal activity of the most active derivatives with that of several known agents.

83 The Electron Sterilization of Certain Pharmaceutical Preparations. George C. Colovos and B. W. Churchill. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Oct. 1957, p. 580-583.

Sterilization in the final package was accomplished with, in most cases, no loss in potency or increase in toxicity, and the pharmaceuticals show no unfavorable reactions.

84 An Evaluation of Certain Hypotensive Agents. I. Diquaternarized Amino Alcohol Esters of Piperidinecarboxylic Acids and a Pyridinecarboxylic Acid. II. Acetylenic Bis-Onium Derivatives. W. J. Hudak, J. P. Buckley, F. M. Schalit, J. J. DeFeo, and E. C. Reif. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Oct. 1957, p. 595-601.

85 Antibacterial and Antifungal Properties of β-Naphthol Derivatives. IV. R. S. Baichwal, Malati R. Baichwal, and M. L. Khorana. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Oct. 1957, p. 603-607.

Activities of a number of β-naphthol and 2-hydroxy-3-naphthoic acid derivatives are reported.

86 Ultrasonic Depolymerization of Natural Polymers. W. F. Head, Jr. and W. M. Lauter. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Oct. 1957, p. 617-621.

Action of 275 kc. waves on naturally occurring gums and on one modified natural material is evaluated.

87 Differential Spectrophotometric Determination of Novobiocin. Piero Sensi, Gian Gualberto Gallo, and Luigi Chiesa. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1611-1613.

Method is based on the spectrophotometric examination of the acid hydrolyzates.

88 Quality Control of Pharmaceuticals. Applications of Quantitative Paper Chromatography in Conjunction With Instrumental Methods. H. J. Pazdera, W. H. McMullen, L. L. Ciaccio, S. R. Missan, and T. C. Grenfell. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1649-1654.

Paper chromatography is coupled with ultra-violet and infrared spectrophotometry, colorimetry, non-aqueous titrimetry, and polarography to yield quantitative procedures suitable for quality control.

89 Colorimetric Assay for Cortisone, Hydrocortisone, and Related Steroids. E. P. Schulz and J. D. Neuss. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1662-1665.

Procedure is based on a chromogen produced by the reaction of the steroid with 2,6-di-*tert*-butyl-*p*-cresol in alkaline solution.

90* Studies of Antibacterial Action. The Mechanism of Apparent Adaptation of Certain Bacteria to Hexachlorophene (G 11). Bernard S. Gould, Norman A. Frigerio, and John Hovanesian. *Antibiotics & Chemotherapy*, v. 7, Sept. 1957, p. 457-464.

91* An Evaluation of Ascites Tumor Cell Plating for Screening Chemotherapeutic Agents. J. A. DiPaolo and G. E. Moore. *Antibiotics & Chemotherapy*, v. 7, Sept. 1957, p. 465-470.

92* The Synthesis of New Erythromycins. R. K. Clark, Jr. and Morris Freifelder. *Antibiotics & Chemotherapy*, v. 7, Sept. 1957, p. 483-486.

None of the five new derivatives were as active as the original material.

93* Amebicidal and Trypanocidal Activity of a New Series of Diamines. William A. Beppler and Leonard B. Schweiger. *Antibiotics & Chemotherapy*, v. 7, Oct. 1957, p. 513-520.

Twenty-six new compounds were screened for activity against *Endamoeba histolytica*, by two different *in vitro* procedures.

94* The Nucleocidin and Alazopeptin Producing Organisms: Two New Species of *Streptomyces*. E. J. Backus, H. D. Tresner, and T. H. Campbell. *Antibiotics & Chemotherapy*, v. 7, Oct. 1957, p. 532-541.

Cultural, morphologic, and physiologic characteristics of *S. calvus* and *S. griseoplanus*.

95* Survival of *Pasteurella Tularensis* in Gelatin-Saline After Cooling and Warming at Subzero Temperatures. Peter Mazur, Morris A. Rhian, and Bill G. Mahlandt. *Archives of Biochemistry and Biophysics*, v. 71, Sept. 1957, p. 31-51.

Results are consistent with a view that death is associated primarily with slow warming or melting of interculluler ice.

96* Surface Active Agents and Cellular Metabolism. I. The Effect of Cationic Detergents on the Production of Acid and of Carbon Dioxide by Baker's Yeast. W. McD. Armstrong. *Archives of Biochemistry and Biophysics*, v. 71, Sept. 1957, p. 137-147.

Cationic detergents are strong inhibitors but anionic detergents are either slightly or not at all inhibitory.

97* Electric Birefringence Studies of Irradiated Deoxyribonucleic Acid. Amos Norman and John A. Field, Jr. *Archives of Biochemistry and Biophysics*, v. 71, Sept. 1957, p. 170-178.

It apears that DNA *in vivo* is well protected against the indirect effects of X-rays.

98* Composition of the Photoactive Subcellular Particles From *Chromatium*. J. W. Newton and G. A. Newton. *Archives of Biochemistry and Biophysics*, v. 71, Sept. 1957, p. 250-265.

99* Studies on the Enzymatic Degradation of the Cholesterol Side Chain. II. Requirements of the Mitochondrial System. Marjorie G. Horning, Donald S. Fredrickson, and Christian B. Anfinsen. *Archives of Biochemistry and Biophysics*, v. 71, Sept. 1957, p. 266-273.

100* Bacterial Permeases. Georges N. Cohen and Jacques Monod. *Bacteriological Reviews*, v. 21, Sept. 1957, p. 169-194.

Reviews recent evidence concerning a few stereospecific permeation systems where the properties and identity of the stereospecific component can best be studied and where the physiological significance of "permeases" as connecting links between the intracellular and the external worlds is most clearly in evidence.

101* The Biosynthesis of Penicillin. VI. A Study of the Mechanism of the Formation of the Thiazolidine-β-Lactam Rings, Using Tritium-Labelled Cystine. H. R. V. Arnstein and J. C. Crawhall. *Biochemical Journal*, v. 67, Oct. 1957, p. 180-187.

102* Vitamin A Deficiency in the Rat, With and Without Added Dietary Cholesterol. B. Green, J. S. Lowe, and R. A. Morton. *Biochemical Journal*, v. 67, Oct. 1957, p. 223-228.

103* The Biochemistry of Aromatic Amines. IV. *O*-Glucosiduronic Acid Derivatives of 2-Naphthylamine. E. Boyland and D. Manson. *Biochemical Journal*, v. 67, Oct. 1957, p. 275-279.

The preparation and properties of 2-amino-1-naphthyl glucosiduronic acid and other derivatives.

104* (English.) **Metabolic Instability of the Ribonucleic Acid Synthesized by *Escherichia Coli* in the Presence of Chloromycetin.** Frederick C. Neidhardt and François Gros. *Biochimica et Biophysica Acta*, v. 25, Sept. 1957, p. 513-520.

A major portion of the RNA formed by *E. coli* in the presence of chloromycetin is rapidly degraded *in vivo* upon removal of the antibiotic. The fragments formed by the degradation accumulate in the medium, and upon the readdition of chloromycetin, re-enter the cells and are repolymerized into RNA.

105 An Effect of Reduced Barometric Pressure on the Peripheral Circulation. F. Girling and F. A. Sunahara. *Canadian Journal of Biochemistry and Physiology*, v. 35, Oct. 1957, p. 777-783.

At a pressure of 225 mm. Hg, forearm blood flow was not affected but hand blood flow was reduced in all subjects.

106 Inhibition of Walker Carcinoma 256 by 6-Aminonicotinamide. J. D. McColl, W. B. Rice, and V. W. Adamkiewicz. *Canadian Journal of Biochemistry and Physiology*, v. 35, Oct. 1957, p. 795-798.

A significant inhibition of the tumor was observed.

107 The Fate of Assimilated $C^{14}O_2$ in the Sugar Beet Leaf Studied by Displacement With $C^{12}O_2$. D. P. Burma and D. C. Mortimer. *Canadian Journal of Biochemistry and Physiology*, v. 35, Oct. 1957, p. 835-843.

Disks of sugar beet leaf that had assimilated $C^{14}O_2$ in light for 10 to 30 sec. showed that most of the C^{14} ultimately accumulates in sucrose in light but in alanine when in darkness.

108 Amidomycin, a New Antibiotic From a Streptomyces Species. Chemical Structure. L. C. Vining and W. A. Taber. *Canadian Journal of Chemistry*, v. 35, Oct. 1957, p. 1009-1116.

The compound $C_{40}H_{68}O_{12}N_4$ is neutral, optically active, and shows no unsaturation nor characteristic light absorption maxima. It is composed of 4 moles each of D (-)-valine and D(-)-α-hydroxyisovaleric acid, linked alternately by ester and amide bonds to form a 24-membered ring.

109 The Carbohydrates. Chemistry, Biochemistry, Physiology. Ward Pigman, editor. 902 p. 1957. Academic Press, New York. (QD321 P62ca)

Review of advances in reaction mechanisms, stereochemistry, transglycosylation, synthesis of radioactive sugars, analysis, histochemistry, photosynthesis, metabolism, nutritional aspects, and isolation and characterization of animal polysaccharides and their protein complexes.

110 A Series of ω-Dimethylaminoalkylphenols. J. P. Brown and E. B. McCall. *Chemical Society, Journal*, 1957, Sept., p. 3875-3880.

Reparation and antibacterial activity of the first four members of the series 4-chloro-2-(ω-dimethylamino-n-alkyl)-3:5-dimethylphenol.

111 The Hydrolysis of Ribitol 1(5)-Phosphate, Riboflavin 5′-Phosphate, and Related Compounds. J. Baddiley, J. G. Buchanan, and B. Carss. *Chemical Society, Journal*, 1957, Sept., p. 4058-4063.

The anhydropentitol produced by acid hydrolysis of ribitol 1(5)-phosphate was isolated and shown to be 1:4-anhydroribitol. It is also formed by acid treatment of ribitol itself. It is suggested that so-called "lyxoflavin" from human heart muscle is a mixture of riboflavin and 2′:5′-anhydroriboflavin.

112 Modified Steroid Hormones. IV. 6-Methylpregnane Derivatives. D. Burn, B. Ellis, V. Petrow, I. A. Stuart-Webb, and D. M. Williamson. **V. 6-Methylandrostane Derivatives.** M. Ackroyd, W. J. Adams, B. Ellis, V. Petrow, and I. A. Stuart-Webb. **VI. Further 6-Methylandrostane Derivatives.** V. Grenville, D. K. Patel, V. Petrow, I. A. Stuart-Webb, and D. M. Williamson. **VII. The Conversion of 3-Oxo-Δ⁴-Steroids Into Their 6-Methyl Homologues.** G. Cooley, B. Ellis, D. N. Kirk, and V. Petrow. *Chemical Society, Journal*, 1957, Sept., p. 4092-4116.

113* "U" Protein and Migration Ratios in Paper Electrophoresis. Joel R. Stern, Roland F. Mais, and Joseph D. Boggs. *Clinical Chemistry*, v. 3, Oct. 1957, p. 599-608.

Describes protein component, migrating between α_2 and β globulin, which was observed in sera of children with chronic glomerulonephritis and nephrotic syndrome.

114* (German.) Inhibition of Ascorbinase by Complex Forming Reagents. **Die Inhibition der Ascorbinase mittels komplexbildender Reagenzien.** A. Jindra and V. Procházka. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1213-1218.

Investigation of inhibition of ascorbinase by several Cu-binding complex-forming reagents. Results show that tetraethylthiuram disulfide causes 50% inhibition in $8.10^{-6}M$ concentration, cupron in $4.10^{-5}M$. Complexon III and carbon monoxide do not show any inhibiting action.

115* Reactions of C^{14}-Labeled Carcinogenic Azo Dyes With Rat Liver Proteins. T. Hultin. *Experimental Cell Research*, v. 13, Aug. 1957, p. 47-59.

An evaluation of the role played by the microsomal material in the formation of azo-proteins.

116* A Photoelectric Recording Set for Pulsation Curves of Heart Muscle Cultures *in vitro*. O. M. Bucher. *Experimental Cell Research*, v. 13, Aug. 1957, p. 109-115.

117* Delaying Vegetable Spoilage With Antibiotics. V. J. Carroll, R. A. Benedict, and C. L. Wrenshall. *Food Technology*, v. 11, Oct. 1957, p. 490-493.

Solutions of three antibiotics were tested for decay control in six vegetables. Oxytetracycline controlled spoilage up to 48 hr. at 30 C. Streptomycin was second and polymyxin least effective.

118* Antibiotics From the Genus Fusaria. II. The Antituberculous Activity of Enniatin-B. M. O. Tirunarayanan and M. Sirsi. *Indian Institute of Science, Journal*, v. 39, sec. A, July 1957, p. 215-219 + 1 plate.

The *in vitro* effect of this antibiotic on the course of experimental tuberculosis in mice is presented.

119* Agar Electrophoresis. II. Quantitative Evaluation of Agar Electrophoresis Patterns of Human Serum Proteins by Densitometry and Comparison With Moving Boundary Electrophoresis. K. V. Giri, Ravindra Nath, and H. Srikantiah. *Indian Institute of Science, Journal*, v. 39, sec. A, July 1957, p. 224-236 + 1 plate.

120* In Vitro Studies of Human Plasma Lipolytic Activity Before and After Oral Fat Intake. Hyman Engelberg. *Journal of Applied Physiology*, v. 11, Sept. 1957, p. 115-160.

121* Effect of a Tranquilizing Agent on Galvanic Skin Response. F. B. Benjamin, K. Ikai, and H. E. Clare. *Journal of Applied Physiology*, v. 11, Sept. 1957, p. 216-218.

Preclorperazine was used.

122 Metabolism of Carbohydrates by *Pseudomonas Saccharophila*. III. Oxidation of D-Arabinose. Norberto J. Palleroni and Michael Doudoroff: *Journal of Bacteriology*, v. 74, Aug. 1957, p. 180-185.

The enzymatic steps involved in the formation of pyruvic and glycolic acids from D-arabinose.

123 Effect of Penicillin, Growth Phase, Ultraviolet Light, and Ultrasonic Vibrations on the Ability of *Proteus mirabilis* to Form L Type Colonies. M. Medill-Brown and W. G. Hutchinson. *Journal of Bacteriology*, v. 74, Sept. 1957, p. 280-285.

124 Fermentation of Amino Acids by *Micrococcus aerogenes*. H. R. Whiteley. *Journal of Bacteriology*, v. 74, Sept. 1957, p. 324-330.

Quantitative data for the fermentation of serine, threonine, glutamate, and histidine.

125 A Selective Enrichment Method for *Gallionella ferruginea*. Sonia Kucera and R. S. Wolfe. *Journal of Bacteriology*, v. 74, Sept. 1957, p. 344-349.

A liquid enrichment medium was developed which permits continuous subculture of the organism at 25 C. Constituents include FeS, NH_4Cl, K_2HPO_4, and CO_2. A small percentage of tap water or iron-bearing water from nature is required in the medium for growth.

126 Variation in the Antibiotic Producing Bacterial Flora of the Human Intestinal Tract. Mary Louise Robbins, Audrey M. Somer, and Leland W. Parr. *Journal of Bacteriology*, v. 74, Sept. 1957, p. 377-380.

127* Mitochondrial Changes Associated With Essential Fatty Acid Deficiency in Rats. Elinor Levin, Ralph M. Johnson, and S. Albert. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 15-21.

Fat-deficient mitochondrial oxidized substrates faster than normal; they also differed physically from normal mitochondria.

128* The Relative Specificity of the Insulinase Activity of Rat Liver Extracts. I. Arthus Mirsky and Gladys Perisutti. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 77-83.

In addition to catalyzing the degradation of insulin, the extract also catalyzed the degradation of casein, ribonuclease, corticotropin, growth hormone, and glucagon under identical conditions.

129* Concentration Work and Energy Dissipation in Active Transport of Glycine Into Carcinoma Cells. Erich Heinz and H. A. Mariani. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 97-111.

130* Ascorbic Acid Catabolism in Guinea Pigs. L. L. Salomon. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 163-170.

Evidence indicates that the biological half-life of ascorbic acid in the guinea pig is neither decreased by stress nor increased by scurvy.

131* Biosynthesis of the Purines. XVI. The Synthesis of Adenosine 5′-Phosphate and 5-Amino-4-Imidazolecarboxamide Ribotide by a Nucleotide Pyrophosphorylase. Joel G. Flaks, Mary Jane Erwin, and John M. Buchanan. **XVII. Further Studies of the Inosinic Acid Transformylase System.** Joel G. Flaks, Leonard Warren, and John M. Buchanan. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 201-229.

132* Metabolism of Adipose Tissue. II. Incorporation of Propionate Carbon Into Lipides by Slices of Adipose Tissue. D. D. Feller and E. Feist. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 275-284.

133* A Physiologically Active Guanidinated Derivative of Insulin. R. L. Evans and H. A. Saroff. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 295-304.

Sedimentation values and solubility properties found for the insulin derivatives were changed only slightly from those of the native zinc insulin.

134* The Formation of N^{10}-Formylfolic Acid From Formamidinoglutaric Acid and Folic Acid. Alexander Miller and Heinrich Waelsch. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 383-395.

Reaction requires a reducing agent and an activator, several of which are listed.

135* Purification and Properties of Pancreatic Cholesterol Esterase. H. H. Hernandez and I. L. Chaikoff. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 447-457.

A purified hog pancreas cholesterol esterase is described which has a 400-fold greater activity per mg. of protein than the acetone powder used as starting material.

136* Viral Invasion. I. Rupture of Thiol Ester Bonds in the Bacteriophage Tail. Lloyd M. Kozloff, Murl Lute, and Kirsten Henderson. **II. The Role of Zinc in Bacteriophage Invasion. III. The Release of Viral Nucleic Acid From Its Protein Covering.** Lloyd M. Kozloff and Murl Lute. *Journal of Biological Chemistry*, v. 228, Sept. 1957, p. 511-546 + 2 plates.

137* Action of Mitochondrial DNAase I in Destroying the Capacity of Isolated Cell Nuclei to Form Gels. Alexander L. Dounce, Marguerite P. O'Connell, and Kenneth J. Monty. *Journal of Biophysical and Biochemical Cytology*, v. 3, Sept. 1957, p. 649-662.

138* Collagen Biosynthesis. Tissue Culture Experiments to Ascertain the Role of Ascorbic Acid in Collagen Formation. J. Frederick Woessner and Bernard S. Gould. *Journal of Biophysical and Biochemical Cytology*, v. 3, Sept. 1957, p. 685-695.

Suggests that for slow collagen biosynthesis as distinct from more prolific collagen-producing systems, ascorbic acid plays an indirect role.

139* Microkinetospheres and VP Satellites of Pinocytic Cells Observed in Tissue Cultures of Gey's Strain HeLa With Phase Contrast Cinematographic Techniques. George G. Rose. *Journal of Biophysical and Biochemical Cytology*, v. 3, Sept. 1957, p. 697-704 + 3 plates.

Activity of a cytoplasmic organoid was followed and correlated with pinocytosis. A hypothesis of the nature of the microkinetosphere and its transformation is presented.

140* Electron Microscope and Low-Angle X-Ray Diffraction Studies of the Nerve Myelin Sheath. H. Fernández-Morán and J. B. Finean. *Journal of Biophysical and Biochemical Cytology*, v. 3, Sept. 1957, p. 725-748 + 12 plates.

A study of the myelin sheath of frog and rat peripheral and central nerves.

141 Optical Activity and the Direct Method of Acylation. Edward Ronwin. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1180-1182.

The product of the direct acylation of amino acids is optically pure in every instance except where benzoyl chloride is employed. This is not the case when the Schotten-Baumann procedure is used. Several nitrobenzoylated amino acids are characterized.

142 Hypotensive Agents. VIII. Azabicyclo[3.2.1]Octane Derivatives. Charles H. Grogan and Leonard M. Rice. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1223-1225.

A series of *N*-dialkylaminoalkyl-3-azabicyclo[3.2.1]octane-2,4-diones have been prepared employing *cis*-1,3-cyclopentane dicarboxylic anhydride, obtained by permanganate oxidation of norbornylene, and appropriate dialkylaminalkylamines. All simple acid addition and quaternary salts were screened for hypotensive activity in dogs. The bis-quaternary salts possessed a good hypotensive action and a favorable therapeutic index.

143 Preparation of 4-Amino-1-Butanols and Some Derivatives of Pharmacological Interest. Carl D. Lunsford, Robert S. Murphey, and Edward K. Rose. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1225-1228.

The 4-alkylamino and 4-dialkylamino-1-butanols are prepared in good yields by $LiAlH_4$ reduction of the reaction product of equimolar amounts of butyrolactone and a primary or secondary amine.

144 Coöperative Transitions in the Binding of Hydrogen Ions by Plasma Albumin. A Proposed Mechanism. Joseph F. Foster and Koichiro Aoki. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1369-1374.

145 Trypsin Monolayers at the Air-Water Interface. II. Effect of X-Ray and Ultraviolet Radiation Upon Enzymatic Activity. III. Structural Postulates on Inactivation. Leroy

G. Augenstine and B. Roger Ray. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1380-1388.

146* Synthesis of C^{14}-Labeled L-Sorbose and L-Ascorbic Acid. H. L. Frush and H. S. Isbell. *Journal of Research, National Bureau of Standards*, v. 59, Oct. 1957, p. 289-292.

147 The Use of Paper Chromatography in the Separation of the Valency States of Biologically Important Metals. H. M. Stevens. *Journal of the Science of Food and Agriculture (Supplement)*, v. 8, 1957, p. s38-s43.

148 The Design of an Apparatus for Biological Experiments at High Hydrostatic Pressure. A. C. Downing and D. R. Wilkie. *Journal of Scientific Instruments*, v. 34, Sept. 1957, p. 353-355.

Describes a simple, cheap design that can be used up to 1000 atm. It was used to record the tension developed by a stimulated muscle.

149* A Brush-Extraction Method for Transmission of Viruses. C. E. Yarwood. *Phytopathology*, v. 47, Oct. 1957, p. 613-614.

When a stiff poster brush was stroked over the surface of a hairy leaf of a virus-infected donor host and then over the surface of a healthy suscept, a high level of infection usually resulted with tobacco, cucumber, peach, apple, and alfalfa viruses.

150* An Interference-Filter Monochromator System for the Irradiation of Biological Material. R. B. Withrow. *Plant Physiology*, v. 32, July 1957, p. 355-360.

151 (German and English.) **Progress in the Chemistry of Organic Natural Products.** L. Zechmeister, editor. 377 p. 1957. Springer-Verlag, Vienna, Austria. (QD245 F77c Vis.)

New developments in the chemistry of plants, including acetylene compounds, sugars, glycosides, and photo-dynamic plant pigments. Biosynthetic relations of natural phenolic and enolic compounds. The carbon cycle in nature.

152* The Action of Various Drugs on the Suprarenal Response of the Rat to Total-Body X-Irradiation. Z. M. Bacq and P. Fischer. *Radiation Research*, v. 7, Oct. 1957, p. 365-372.

Action of cysteamine, morphine, and nembutal.

153* Late Effects of Whole-Body X-Irradiation in the Mouse. Some Gross and Histologic Aspects of the Development of Morbidity Prior to the Terminal State, With Special Reference to the Gonad, Uterus, Heart, Liver, Kidney, and Submaxillary Gland. Henry I. Kohn, Robert F. Kallman, Charles C. Berdjis, and Kenneth B. De Ome. *Radiation Research*, v. 7, Oct. 1957, p. 407-435.

154* Propagation of Poliovirus in Chick Embryo Cell Cultures. I. Cultivation of 3 Virus Types. Wolcott B. Dunham and Frances M. Ewing. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, Aug.-Sept. 1957, p. 637-639.

155* Failure to Transmit Common Cold to Suckling Hamsters. William S. Jordan, Jr. and Floyd W. Denny, Jr. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, Aug.-Sept. 1957, p. 651-653.

Inoculation of 138 hamsters gave no evidence to indicate that human colds can be transmitted to them.

156* Means of Increasing the Tolerated Dose of Isoniazid in Mice. III. Certain Vitamins. Benjamin Prescott, Gladys, Kauffmann, and Walter D. James. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, Aug.-Sept. 1957, p. 705-708.

Nineteen vitamin-like substances are evaluated.

157* Pharmacological Studies With Pseudoreserpine and Raunescine, Two Alkaloids Isolated From *Rauwolfia canescens Linn.* Sol Rothman and Ida Maria Toekes. *Society for Experimental Biology and Medicine, Proceedings*, v. 95, Aug.-Sept. 1957, p. 789-791.

Both agents are less potent than reserpine.

158* Soil Organic Matter-Metal Complexes. II. Cation-Exchange Chromatography of Copper and Calcium Complexes. F. E. Broadbent. *Soil Science*, v. 84, Aug. 1957, p. 127-131.

159* Chemotherapy, a Solution to the Cancer Problem? B. R. Baker. *SRI, Journal*, v. 1, no. 3, 1957, p. 66-71.

The chemotherapy concept, program, and background; design of potential anticancer chemicals.

160* Use of Carbon-14 and Tritium for the Study and Characterization of Cellulose and Other Polysaccharides. H. S. Isbell, H. L. Frush, and J. D. Moyer. *Tappi*, v. 40, Sept. 1957, p. 739-743.

A simple, sensitive means for the study of carbohydrate materials; typical applications are described.

161* The Biological Decomposition of Lignin—Literature Survey. L. R. Lawson, Jr. and C. N. Still. *Tappi*, v. 40, Sept. 1957, p. 56A + 10 pages.

Characteristics of 72 wood-destroying fungi are tabulated.

162 Proceedings of the Second Annual Meeting on Bio-Assay and Analytical Chemistry. October 11 and 12, 1956. *University of California, Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, WASH-736, Sept. 1957, 163 p. (UF767 Un3.1w Contin.)

Methods and devices for detecting radioactive material in the human body and various biological materials.

163 Photosynthesis. Melvin Calvin. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL 3848, July 1957, 32 p. (UF767 U3u Contin.)

The use of C-14 tracers has made possible considerable progress in the mapping of the routes taken by the C atom from CO_2 into plant substances. Techniques making this progress possible lie largely in the region of chromatography and radioautography involving fractional γ amounts of material.

164 Semiannual Report to the Atomic Energy Commission. Leon O. Jacobson and Antreen Pfau. *University of Chicago, Argonne Cancer Research Hospital (U. S. Atomic Energy Commission)*, ACRH-7, Mar. 1957, 86 p. (UF767 Un3.1ac Contin.)

Eleven papers reporting on various phases of recent research relating to cancer.

See also: **54** (effect of trace metals on metabolism of microorganisms); **774** (rates of spore destruction by heat and bacteriacides); **780** (vitamin K_5); **862** (microtome); **875** (bacterial colony counter); **1249** (cyclotron for medical research).

CERAMICS AND CONCRETE

165* (Russian.) Calculation Methods for Electric Glass Furnaces. **Metod rascheta elektricheskikh steklovarennykh vannykh pechei.** A. F. Melik-Akhnazarian. *Akademiia Nauk Armianskoĭ SSR, Izvestiia, Seriia Tekhnicheskikh Nauk*, v. 10, no. 4, 1957, p. 21-31.

Calculation of relations between productive capacity, geometrical size, and electrical parameters of the hot zone of a furnace equipped with cooled electrodes.

166* (Russian.) The Layers of Glass Near the Electrodes in Electric Glass Furnaces. **O prielektrodnom sloe stekla v steklovarennykh elektricheskikh pechakh.** M. G. Manvelian, A. F. Melik-Akhnazarian, K. A. Kostanian, and S. O. Nalchadzhian. *Akademiia Nauk Armianskoĭ SSR, Izvestiia, Seriia Tekhnicheskikh Nauk*, v. 10, no. 4, 1957, p. 53-59.

There is no difference between the layers of glass near the electrode and the main mass of the glass. Samples show that the Fe_2O_3 concentration in all layers is from 0.3 to 0.42%.

167 Cermets. III. Modes of Fracture and Slip in Cemented Carbides. N. M. Parikh. *American Ceramic Society, Journal*, v. 40, Oct. 1957, p. 335-339.

Modes of fracture are determined by the microstructures which in turn are influenced by the relative surface energies of different interfaces. A critical film thickness is observed in disperse systems at which point the imparted energy is absorbed in creating slip bands rather than fracture.

168 The Mechanism of Filter Pressing and Slip Casting. D. S. Adcock and I. C. McDowall. *American Ceramic Society, Journal*, v. 40, Oct. 1957, p. 355-362.

Literature on the mechanism of the slip-casting process is reviewed. An equation is developed to give a quantitative description of the rate at which the clay layer is deposited from the slip in the filter-pressing and slip-casting processes.

169* Lightweight-Aggregate Concrete for Structural Use. J. J. Shideler. *American Concrete Institute, Journal*, v. 29, Oct. 1957, p. 299-328; *ACI Proceedings*, v. 54, 1957, p. 299-328.

Data are reported on concrete mix proportions, compressive and flexural strength, modulus of elasticity, bond, creep, and drying shrinkage. Concrete mixes were designed to produce compressive strengths of 3000 and 4500 psi. with each aggregate, and 7000 to 10,000 psi. with three selected aggregates.

170* (German.) Calorimetric Tests on the $\alpha \rightleftarrows \beta$ Conversion of Cristobalite. **Kalorimetrische Untersuchungen zur $\alpha \rightleftarrows \beta$ Umwandlung des Cristobalits.** Otto Krisement, Hanna Schädler, Gerhard Trömel, and Karl-Heinz Obst. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 523-530.

The α-β conversion of cristobalite was studied by a microcalorimetric process on spectroscopically pure cristobalite powder. Crystallization took place in 10 hrs. to 10 days at temperatures of 1400 to 1680 C.

171 Interaction of Uranium and Its Alloys With Ceramic Oxides. H. M. Feder, N. R. Chellew, and C. L. Rosen. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5765, July 1957, 21 p. (UF767 Un3.1an Contin.)

The corrosion of ceramic oxides by molten U and its alloys was examined. Dense, high-purity alumina, magnesia, zirconia, beryllia, and thoria were studied. The studies included: wettability of ceramics, products of reaction, mechanism of reaction, contamination of molten U by crucible material, and the effect of alloying additions on these.

172* (Russian.) Certain Peculiarities in the Structure and Properties of Quick-Setting Concrete, Frozen at an Early Stage. **Nekotorye osobennosti struktury i svoistv bystrotverdeiushchego betona, zamorozhennogo v rannem vozraste.** *Beton i Zhelezobeton*, 1957, no. 9, Sept., p. 343-348.

Freezing of this quick-setting concrete in 8 to 24 hr. after setting does not affect its properties.

173* (Russian.) Use of Porous Concrete for Building Construction in Arctic Regions. **Opyt primeneniia krupnoporistogo betona dlia sten zdanii v arktike.** N. I. Zapatrin. *Beton i Zhelezobeton*, 1957, no. 9, Sept., p. 348-351.

Scarcity of any other building material and the presence of unlimited supply of gravel made concrete an important building material in Arctic regions.

174 Plasticity. A Critical Survey. E. C. Bloor. *British Ceramic Society, Transactions*, v. 56, Sept. 1957, p. 423-481.

The plasticity of clay pastes, the water films between clay particles, consolidation, the effects of alignment of particles, as well as the effect on plasticity of mineral type, fineness, base exchange, and surface tension are reviewed in the light of a wide variety of experimental evidence.

175 Ceramics and the Development of Nuclear Power. D. T. Livey. *British Ceramic Society, Transactions*, v. 56, Sept. 1957, p. 482-498.

The possibility of using ceramics in a nuclear reactor and some of the problems involved are indicated. In general, ceramics have high melting-point, hardness, and corrosion resistance, and promise good irradiation stability, but are brittle, of low strength, and have poor thermal shock resistance. Their use depends on successful fabrication and correct design.

176 Determination of Pore Size Distribution in Refractory Materials. L. Zagar. *Henry Brutcher Translation No.* 3924, 6 p. (From *Archiv für das Eisenhüttenwesen*, v. 26, no. 9, 1955, p. 561-562.) Henry Brutcher, Altadena, Calif.

Procedure is based on the consideration that when pores of different sizes are filled with water, air pressures of correspondingly different magnitudes are required to drive the water out of the pores.

177* (German.) Determination of Changes of Lattice Parameters of Various Graphites. **Bestimmung der Änderungen des Gitterparameters verschiedener Graphite.** M. F. Kessler. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1097-1105 + 2 plates.

Evaluation of existing methods and description of a new method and its advantages.

178 The Past and Future of Silicon Carbide. G. M. Butler. *Electrochemical Society, Journal*, v. 104, Oct. 1957, p. 640-644.

Covers past and present uses and developments of SiC and suggests some future uses which might be developed by research.

179* (French.) Report on the Congress of Ceramic Techniques Held in Paris, June 5, 6, 7, 1957. **Compte rendu du congrès technique céramique.** *Flamme et Thermique*, v. 10, Aug. 1957, p. 18-25.

Colorimetric determination of alumina in silica bricks, spectrographic determination of SiO_2 and Al_2O_3, determination of Fe_2O_3 diffusion in quartzites by means of radioactive Fe-59 tracer, quality index for open hearth furnace silica, and other ceramic problems were studied.

180* (German.) Prestressed Concrete as Structural Material for Large Pipelines. Report on a Trip. **Vorgespannter stahlbeton als Baustoff für Grossrohrleitungen—Ein Reisebericht.** Fritz Wurz. *Gas- und Wasserfach (Special Ed.)*, v. 98, nos. 34-35, Aug. 30, 1957, p. 857-859.

Characteristics of prestressed concrete pipes. Methods for laying the pipe. Cathodic protection techniques.

181 Distribution of Radiation Damage in Graphite. R. E. Nightingale and W. A. Snyder. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-49626, (Rev.) June 1957, 15 p. (UF767 Un3.1hw Contin.)

A series of graphite samples with 30 C reactor irradiation exposure ranging from 400 to 5700 MD/T was thermally annealed. Changes in length, interlayer spacing, and crystallite size were observed.

182 Etching of Refractories and Cermets by Ion Bombardment. T. K. Bierlein, H. W. Newkirk, and B. Mastel. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51028, June 1957, 15 p. (UF767 Un3.1hw Contin.)

The microstructure of refractories and cermets can be satisfactorily revealed by ion etching. A single method and apparatus can be used to etch such widely dissimilar materials as a metallic conductor and a refractory insulator. The method produces a surface ideally suited for optical and electron microscopy.

183 Correlation of Surface Characteristics With the Sintering Behavior of Uranium Dioxide Powders. D. R. Stenquist, B. Mastel, and R. J. Anicetti. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51712, July 1957, 20 p. (UF767 Un3.1hw Contin.)

Powders from various sources had a wide variety of surface characteristics; surface area values depend upon both particle size and surface texture; surface area and average diameter can be used as a measure of the sinterability of UO_2 powders.

184 Processing Variables, Reactivity, and Sinterability of Uranium Oxides. D. A. Vaughan, J. R. Bridge, A. G. Allison, and C. M. Schwartz. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1699-1700.

Methods of preparing UO_2 to yield sintered bodies of high density were investigated because of current interest in this material as a reactor fuel. Wet milling of UO_2 before reduction increases the sintered density of UO_2 from 70 to 95% of theoretical, when formed at 20,000 psi. and sintered at 1650 C.

185 Recent Technical Developments in Ceramics and Refractory Materials. II. John H. Koenig and Edward J. Smoke. *Industrial Heating*, v. 24, Sept. 1957, p. 1851 + 3 pages.

Properties and applications of cermets, electronic ceramics, constructional materials, and cutting tools.

186 An Investigation of the Phase Compositions of an Iron-Rich Nickel-Zinc Ferrospinel. C. F. Jefferson and Edgar F. Westrum, Jr. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1430-1432.

Studies of compositions in the system $Ni_xZn_{1-x}Fe_2O_4$-Fe_2O_3 in equilibrium in air at one atmosphere pressure.

187 Hydrothermal Reactions Under Supercritical Conditions. III. The Effect of *p*H on the Crystallization of Silicon Dioxide. Richard G. Yalman and James F. Corwin. **IV. The Reaction Between Strontium Hydroxide and Silica.** J. F. Corwin, R. G. Yalman, J. W. Edwards, and E. R. Shaw. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1432-1439.

188 Some New Electrical and Magnetic Ceramics. G. Campbell. *Journal of Scientific Instruments*, v. 34, Sept. 1957, p. 337-348.

Preparation and properties of insulator, conductor, ferroelectric, and ferromagnetic components.

189* (Russian.) Dielectric Properties of Ceramic Materials of the CaO-BaO-TiO_2 System. **Dielektricheskie svoistva keramicheskikh materialov v sisteme CaO-BaO-TiO_2.** A. A. Apsit, E. Zh. Freidenfel'd, and V. Ia. Fritsberg. *Latvijas PSR Zinātnu Akademijas, Vestis*, 1957, no. 7, p. 119-127.

Study of specimens of various compositions in the ternary system CaO-BaO-TiO_2. Specific inductive capacitance vs. temperature and specific inductive capacitance vs. field intensity curves are shown.

190 Ceramic Fiber—Seven Forms and How to Use Them. C. B. Walworth. *Materials in Design Engineering*, v. 46, Oct. 1957, p. 124-129.

Aluminum silicate refractory in the form of paper, block, textiles, castings, batts, moldings, and in bulk form has many high temperature applications.

191* (Russian.) Study of the Hydration of a Magnesite Mass, and Its Effect on the Sintering of Articles During Firing. **Issledovanie gidratsii magnezitovoi massy i ee vliianiia na spekanie izdelii v obzhige.** I. S. Kainarskii and N. D. Nazarenko. *Ogneupory*, v. 22, no. 9, 1957, p. 392-398.

Relation between aging of the magnesite body and the porosity of the fired ware.

192* (Russian.) Chemical Destruction of Chrome-Magnesite Furnace Lining. **Khimizm razrusheniia khromomagnezitovykh ogneuporov v protsesse ikh sluzhby v vel'ts-pechakh.** A. M. Davidson, P. A. Polkvoi, and G. A. Rashin. *Ogneupory*, v. 22, no. 9, 1957, p. 417-425.

Changes in chemical composition occurring in the furnace lining were studied by taking samples from various levels after three months operation.

193 Contact Effects Resulting From Compression and Flash Sintering in Graphite Powders. F. A. Lewis, J. Orr, and A. R. Ubbelohde. *Physical Society, Proceedings*, v. 70, no. 454B, Oct. 1957, p. 928-936.

When compressed up to 3600 kg.cm.$^{-2}$ in the cold, a marked decrease of electrical resistance is produced. Mechanisms of sintering that avoid any prolonged heating of the graphite at high temperatures were explored where loosely pressed powders were subjected to flash discharges.

194* (French.) Certain Aspects of Thermal Evolution and Stabilization of the Properties of Glass. **Certains aspects de l'évolution thermique et de la stabilisation des propriétés du verre.** Lucien Prod'homme. *Revue d'Optique*, v. 36, July 1957, p. 309-342.

Variation of the refractive index and absorption of different glasses as functions of temperature and viscosity. Effects of fast rates of cooling and heating on borosilicate glass. Tempered glass compared to annealed glass.

195* (French.) The Effect of Hydration of Batch Constituents on the Processing of Glass. **L'influence de l'hydratation de certains constituants de la composition à verre sur les manipulations de celle-ci.** M. Gantois. *Silicates Industriels*, v. 22, Sept. 1957, p. 461-467.

Hydration of batch materials can be avoided by maintaining temperatures above 33 C.

196* (German.) Basic Raw Materials of the Central German Stoneware Industry. **Die Rohstoffbasen für die mitteldeutsche Steinzeugindustrie.** Johannes Pomper. *Silikattechnik*, v. 8, Aug. 1957, p. 322-323.

Surveys the origin, approximate thickness, and utilization of clays found in this area.

197 Steelplant Refractories. Testing, Research, and Development. J. H. Chesters. 2nd Ed. 728 p. 1957. The United Steel Companies, Ltd., Sheffield, England. (TN677 C42s2)

Methods of testing. Properties, manufacture, and application of silica, magnesite, dolomite, chrome, chrome-magnesite, and alumino-silicate materials. Open-hearth furnaces; acid and basic bessemer converters. Soaking pits, reheating furnaces, and heat treatment furnaces. The electric steel plant. The casting pit.

198* (Russian.) Accelerating Agents in the Glass-Making Process, and the Production Increase of Furnaces. **Uskoriteli varki - moshchnoe sredstvo povysheniia proizvoditel'nosti steklovarennykh pechei.** M. P. Orlova, V. V. Polliak, and I. D. Tykachinskii. *Steklo i Keramika*, v. 14, no. 9, Sept. 1957, p. 1-4.

Use of fluorine compounds in the glass-making process and particularly the use of Na_2SiF_6.

199* (Russian.) Use of Na_2SiF_6 for Accelerating the Glass-Making Process. **Primenenie kremneftoristogo natriia dlia uskoreniia varki stekla.** A. S. Spiridonov and V. V. Vel'mina. *Steklo i Keramika*, v. 14, no. 9, Sept. 1957, p. 4-5.

The addition of Na_2SiF_6, for a calculated 0.5% F content, increases the quality of glass and accelerates the melting process. At the same time there was no notice of any ill effect of Na_2SiF_6 on the furnace lining.

200* (Russian.) Use of Surface Active Substances in Production of Ceramic Articles by the Soft-Mud Method. **Primenenie poverkhnostno-aktivnykh veshchestv pri plasticheskom sposobe proizvodstva keramicheskikh izdelii.** G. V. Kukolev and A. N. Korol'. *Steklo i Keramika*, v. 14, no. 9, Sept. 1957, p. 14-17.

Effects on the physical and mechanical properties of kaolin and refractory and brick clays. Determination of optimum concentration.

201* (Russian.) Method of Measurement of the Heat Conductivity Coefficient of Refractory Materials at High Temperatures. **Metodika izmereniia koeffitsienta teploprovodnosti ogneuporov pri vysokikh temperaturakh.** V. V. Pustovalov. *Zavodskaia Laboratoriia*, v. 23, no. 9, Sept. 1957, p. 1093-1094.

Development of an instrument for determination of the coefficient at temperatures up to 1500 C. The instrument is based on a simple method of cylindrical sheathing.

202* (Russian.) Preparation of a Group of Glasses With Enhanced Dielectric Permeability and Investigation of Their Dielectric Properties. **Poluchenie i issledovanie dielektricheskikh svoistv gruppy stekol s povyshennoi dielektricheskoi pronitsaemost'iu.** G. I. Skanavi and A. M. Kashtanova. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1770-1777.

Preparation of a group of boron-lead-titania glasses with higher dielectric permeability (ε=35) and high puncture voltage ($Ep=2\cdot10^6$ v/cm.). Investigation of the glass structure.

See also: **274** (spectroanalysis of magnesite and open-hearth liners); **295** (analysis of clays); **315** (use of Li compounds); **584** (electric conductivity of glass); **858** (level detection gage for glass furnace); **1226** (concrete for radiation shielding); **1365** (domain effects in $BaO-TiO_2$).

CHEMICAL ENGINEERING

203* Study of the Mechanism of Caking and Its Prevention in Some Granular Fertilizers. *Agricultural Chemicals*, v. 12, Oct. 1957, p. 38 + 3 pages.

Use of conditioners, such as kaolin and kieselguhr, as aids in reducing caking in storage of fertilizers.

204 Simple Theory of an Idealized Turbulent Mixer. Stanley Corrsin. *A.I.Ch.E. Journal*, v. 3, Sept. 1957, p. 329-330.

With stationary isotropic turbulence postulated, the rate of decrease in concentration fluctuations of a scalar contaminant is estimated in terms of the turbulence scale and the power input to the system.

205 Drying of Sand on a Hot Surface. R. W. Ludt. *A.I. Ch.E. Journal*, v. 3, Sept. 1957, p. 343-347.

Constant layer moisture at the hot surface is found to exist during the constant-rate period of drying in still air. Plate temperature is normally the most important factor in determining the constant drying rate.

206 Two-Phase, Steam-Water Critical Flow. H. S. Isbin, J. E. Moy, and A. J. R. Da Cruz. *A.I.Ch.E. Journal*, v. 3, Sept. 1957, p. 361-365.

207 Gas Mixing in a Square Duct. Eugene Miller, S. P. Foster, R. W. Ross, and Kurt Wohl. *A.I.Ch.E. Journal*, v. 3, Sept. 1957, p. 395-404.

By means of shadowgraph and probe sampling techniques a description is given of the manner in which a gas flowing in a square duct mixes with a secondary gas introduced sidewise.

208* (German.) The Separation of Isotopes by Distillation. **Zur Isotopentrennung durch Destillation.** G. Richter. *Annalen der Physik*, v. 20, nos. 1-6, 1957, p. 45-52.

Increase of the separating capacity of a distillation column producing small flow fluctuations is caused by the buffer action of the liquid content.

209* Modes of Condensation and Their Effect on Heat Transfer. H. Hampson. *British Chemical Engineering*, v. 2, Oct. 1957, p. 532-535.

Reviews the method whereby increased rates of condensation may be obtained by promoting dropwise condensation.

210* Liquid Atomisation in Chemical Engineering. III. Pressure Nozzles. R. P. Fraser, P. Eisenklam, and N. Dombrowski. *British Chemical Engineering*, v. 2, Oct. 1957, p. 536-543.

Classification and performance of pressure nozzles. Energy requirements and efficiency of pressure atomization.

211* Design, Operation and Application of Grid Trays. *British Chemical Engineering*, v. 2, Oct. 1957, p. 544-547.

How reliable comparisons of the advantages and disadvantages of the many types of rectification column plate may be made.

212* Now: Two Petrochemical Routes of Glycerine. Peter W. Sherwood. *British Chemical Engineering*, v. 2, Oct. 1957, p. 548-551.

Methods employed by American chemical companies for the production of the intermediates acrolein and H_2O_2 as well as for the final conversion which leads to glycerine itself.

213 Equilibrium Constants via Nomograph. Norbert W. Luft. *Chemical Engineering*, v. 64, Nov. 1957, p. 235-237.

New nomograph extends range of the scanty supply of published working data and speeds up equilibrium calculations for a wide range of industrially important gas-phase reactions.

214 Thermodynamic Properties of Pure and Mixed Hydrocarbons. III. Pure Substance Enthalpy and Entropy. Merk Hobson and James H. Weber. *Chemical Engineering*, v. 64, Nov. 1957, p. 245-250.

How to derive entropy and enthalpy, how to compare methods, plus data for these process design essentials.

215 Flow Through Packings and Beds. Correlations in Fluidized Systems. Max Leva. *Chemical Engineering*, v. 64, Nov. 1957, p. 266-270.

How to predict the start of fluidization and estimate fluidization mass velocity, expanded bed height, nature and significance of fluidization efficiency in fluid-solids systems.

216 Large-Scale Continuous Production of Ammonium Perchlorate. Joseph C. Schumacher and David R. Stern. *Chemical Engineering Progress*, v. 53, Sept. 1957, p. 428-432.

Details of a modern plant, covering the process, instrumentation, and operating variables.

217 Commercial Ethylene Production by Propane Pyrolysis in a Molten Lead Bath. J. R. Fair, J. W. Mayers, and W. H. Lane. *Chemical Engineering Progress*, v. 53, Sept. 1957, p. 433-438.

A molten Pb bath was found in a plant-scale investigation, to be as effective for propane pyrolysis as a tubular reactor, without certain disadvantages of the latter.

218* (German.) The Relationship Between Heat- and Mass-Exchange in the Condensation of Vapors From Soluble Binary Mixtures. **Beziehung zwischen Wärme- und Stoffaustausch bei der Kondensation von Dämpfen löslicher Zweistoffgemische.** Emil Kirschbaum. *Chemie-Ingenieur-Technik*, v. 29, Sept. 1957, p. 595-599.

In the condensation of vapors from a multi-component mixture, the resulting temperature at the interface between the phases is lower than in the center of the vapor.

219* (French.) A Pulverizing Atomizer. Application to Ammonium Nitrate. **Pulvérisateur-atomiseur. Application au nitrate d'ammonium.** J. Tranchant. *Chimie Analytique*, v. 39, Sept. 1957, p. 341-344.

Description of an apparatus used to recrystallize and dry substances in a hot and highly concentrated solution such as various mixtures based on NH_4NO_3. The size of the crystals or grains obtained was between 50 and 100μ.

220 Use of Stainless Steel to Combat Corrosion in the Chemical Industry. II. Charles P. Dillon. *Corrosion*, v. 13, Oct. 1957, p. 138 + 4 pages.

221 Potassium Borohydride Manufacture. Walter S. Fedor, M. Douglas Banus, and David P. Ingalls. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1664-1672.

The method of production is indirect in that sodium borohydride is made first, then converted to potassium borohydride.

222 Metal Terephthalamates. A New Class of Oil-Gelling Agents. B. W. Hotten. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1691-1694.

Unsymmetrical intermediate was selectively synthesized by controlled saponification of dimethyl terephthalate to potassium methyl terephthalate. It was converted to methyl terephthalamates via the acid chloride or by direct amidation in the presence of phosphorus trichloride.

223 Carbon Tetrachloride Manufacture. Walter L. Hardy. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 57A-58A.

Raw material requirements; manufacturing process; cost.

224 Design and Operation of a Pilot Plant. R. H. Kinsey and J. L. Chynoweth. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 65A + 3 pages.

225* A Continuous Titrator Controller for Chemical Process Slurries. Porter Hart. *ISA Journal*, v. 4, Oct. 1957, p. 472-473.

Slurry is diluted in an exact, but adjustable ratio; continuous titration is done automatically; alkalinity of the slurry is automatically controlled.

226 The Ammonia-Carbon Dioxide-Water Equilibrium in Boiler Feedwater Conditioning. C. D. Weir. *Journal of Applied Chemistry*, v. 7, Sept. 1957, p. 505-512.

Charts show equilibrium relations between ammonia and CO_2 in aqueous solutions at temperatures to 200 C over the range of pH values of interest in feedwater conditioning.

227* Pumps and Their Selection for Chemical Duties. Herbert Addison. *Manufacturing Chemist*, v. 28, Sept. 1957, p. 411-415.

Some expert advice on pump selection.

228 Particulate Clouds Dusts, Smokes and Mists. H. L. Green and W. R. Lane. 425 p. 1957. E. & F. N. Spon, Ltd., London. (QD549 G82p)

Basic physics and physical chemistry of individual suspended particles in gases, and of clouds of particles, with special reference to their formation, stability, optics, estimation, and aerodynamics; industrial and environmental aspects.

229* Hydrogen Treating in the Refinery. II. P. W. Sherwood. *Petroleum*, v. 20, Oct. 1957, p. 363-367.

Description of various processes, including Shell's vapor-phase, Esso's hydrofining, and Gulf's HDS process.

230* Two Aspects of Automation in Refining. Process Control and Operating Guide. Leo Walter. *Petroleum*, v. 20, Oct. 1957, p. 369-371.

Deals with the means for placing before the operator large masses of information of the type that is usually associated with very complex processes and equipment.

231 Predicting V-L Equilibrium Data. Lawrence N. Canjar, Herbert B. Ford, and Raynor T. Sebulsky. *Petroleum Refiner*, v. 36, Oct. 1957, p. 135-139.

Method applies to multicomponent mixtures and is adaptable to computer programs.

232* (Czech.) The Preparation of Pure Methane From Natural Gas. **Příprava čistého methanu ze zemního plynu.** Vladimir Procházka. *Práce Ústavu pro Výzkum a Využití Paliv*, v. 8, nos. 17-26, 1957, p. 35-46.

Removal of CO_2, saturated and unsaturated hydrocarbons, S compounds, water vapor, O, and other permanent gases is effected by active charcoal, metallic Ca, and subsequent repeated condensation and evaporation in a specially designed apparatus.

See also: **855** (computer for searching chemical literature); **1218** (testing of petrochemical equipment); **1342** (production of fertilizer as ore-dressing by-products).

CHEMISTRY—ANALYTICAL

233* (English.) **Determination of the Number of Free *ortho* and *para* Positions in Phenols.** Bengt Smith. *Acta Chemica Scandinavica*, v. 11, no. 5, 1957, p. 839-845.

New method uses bromide-bromate titration in glacial acetic acid and conductometric titration in ethyl alcohol-water.

234 A Simplified Nitrite Procedure for the Determination of Reserpine. Daniel Banes. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Oct. 1957, p. 601-603.

Extraction and determination in crystalline samples and in reserpine tablets.

235* Some Experiments With Spectrofluorimeters and Filter Fluorimeters. C. A. Parker and W. J. Barnes. *Analyst*, v. 82, Sept. 1957, p. 606-618 + 4 plates.

Fluorescence emission spectra of liquids were measured by using laboratory-made accessories in conjunction with a small monochromator, photomultiplier tube, and commercially available a.c. amplifier. Apparatus can also be used for the measurement of fluorescence "excitation" spectra, or as a simple filter fluorimeter when high sensitivity is required. Examples of the analytical application of fluorescence emission spectra are given.

236* The Determination of Antimony in Cast Iron. R. C. Rooney. *Analyst*, v. 82, Sept. 1957, p. 619-623.

Sample is dissolved in HNO_3 under controlled conditions. The residue consisting of graphite and silica, is filtered off, and Sb is determined separately in the residue and in the filtrate spectrophotometrically.

237* The Determination of Tin in Zirconium and Its Alloys. D. F. Wood and R. T. Clark. *Analyst*, v. 82, Sept. 1957, p. 624-630.

Volumetric method is based on the direct reduction of Sn with Al in the presence of titanous ions and subsequent oxidation of Sn with a standard solution of KIO_3.

238* Separation of Niobium From Tantalum, Titanium, Tin and Antimony by Means of 8-Hydroxyquinoline. G. K. Belekar and V. T. Athavale. *Analyst*, v. 82, Sept. 1957, p. 630-634.

239* An Automatic Apparatus for the Quantitative Micro-Determination of Nitrogen. F. E. Charlton. *Analyst*, v. 82, Sept. 1957, p. 643-648.

240* (English.) **Wet Oxidation of Organic Matter Employing Perchloric Acid at Graded Oxidation Potentials and Controlled Temperatures.** G. Frederick Smith. *Analytica Chimica Acta*, v. 17, Aug. 1957, p. 175-185.

Perchloric acid concentrations tested were from 55-68%.

241* (French.) Separation and Determination of Boron Traces in Silicon. **Séparation et dosage de traces de bore dans le silicium. I.** Application of the Chloroform Extraction Method in the Form of Tetraphenylarsonium Fluoroborate. **Application de la méthode d'extraction chloroformique sous forme de fluoborate de tétraphénylarsonium.** L. Ducret and P. Seguin. **II.** A New Method of Separation and Determination of Boron Traces. Application to the Determination of Boron in Silicon. **Nouvelle méthode de séparation et de dosage de traces de bore. Application au dosage du bore dans le silicium.** Lucien Ducret. *Analytica Chimica Acta*, v. 17, Aug. 1957, p. 207-219.

242* (English.) **The Micro Volumetric Determination of Uranium With Application to Bismuth Base Alloy Analysis.** G. W. C. Milner and G. A. Barnett. *Analytica Chimica Acta*, v. 17, Aug. 1957, p. 220-225.

Method was applied to the analysis of Bi alloys contained U in concentrations from 0.005 to 0.1% by weight.

243* (English.) **Electro-Chromatography in the Separation of Ions. II. Separation of Precious Metals.** A. K. Majumdar and M. M. Chakrabartty. *Analytica Chimica Acta*, v. 17, Aug. 1957, p. 228-231.

244* The Estimation of Vanadium in Plant Materials. G. B. Jones. *Analytica Chimica Acta*, v. 17, Aug. 1957, p. 254-258.

Quantities of V down to 0.006 μg. are measured polarographically.

245* (English.) **Ion Exchange Separations in the Analysis of Bismuth Base Alloys. I. Binary Alloys With Uranium and Thorium.** G. W. C. Milner and J. W. Edwards. *Analytica Chimica Acta*, v. 17, Aug. 1957, p. 259-263.

Procedures are described for the determination of U (0.001-10%) and Th (0.05-10%) in binary mixtures with Bi.

246 Simple Liquid Scintillation Counter for Chemical Analysis With Radioactive Tracers. William Seaman. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1570-1572.

Examples of use are given for counting tritium activity in tritiated triolein and for determining naphthalene in tar oil fractions by the isotope-dilution method using naphthalene tagged with C-14.

247 Determination of Uranium in Natural Waters. L. L. Thatcher and F. B. Barker. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1575-1578.

Development of a fluorophotometric procedure.

248 Evaluation of Radiochemical Separation Procedures. Duane N. Sunderman and W. Wayne Meinke. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1578-1589.

Chromate, nitrate, chloride, oxalate, and sulfate precipitations were studied to determine the conditions for optimum radiochemical separation of Ba, Sr, and Ca. Procedures for the systematic separation of these ions in tracer solutions are discussed, along with methods for separating radioactive Ag.

249 Uranium Determination by the Isotope Dilution Technique. Paul Goris, Wayne E. Duffy, and Fred H. Tingey. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1590-1592.

250 Determination of Protactinium-233. F. L. Moore and S. A. Reynolds. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1596-1599.

Extraction with diisobutylcarbinol. Data on elimination of interference of certain chemical and radioactive species. Half life and γ spectrum.

251 Separation of Organic Sulfur Compounds by Liquid Thermal Diffusion. C. J. Thompson, H. J. Coleman, C. C. Ward, and H. T. Rall. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1601-1611.

Process was applied to some 50 binary mixtures of pure compounds as well as to S-containing petroleum distillates. Both batch and continuous operations were studied. Liquid thermal diffusion will separate most S compounds of different types from each other and from hydrocarbons, some with greater efficiency than others.

252 Spectrophotometric Determination of Small Quantities of Some Individual Pyridine Bases by Successive Extractions. Ta-Chuang Lo Chang and Clarence Karr, Jr. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1617-1619.

Procedure for determination of the bases in aqueous methanol solutions involves removal of methanol, followed by two successive extractions with isooctane.

253 Spectrophotometric Determination of Lithium Carbide in Metallic Lithium as the Acetylene-Silver Perchlorate Complex. T. W. Gilbert, Jr., A. S. Meyer, Jr., and J. C. White. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1627-1630.

254 Polarographic Behavior of 1,1,1,2-Tetrachloro-2,-2-bis(*p*-Chlorophenyl)-Ethane. Isadore Rosenthal, Gino J. Frisone, and René J. Lacoste. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1639-1641.

255 Long-Chain Amines. Versatile Acid Extractants. Fletcher L. Moore. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1660-1662.

Studies on a new anionic liquid-liquid extraction technique are described. Solutions of long-chain amines are shown to be excellent extractants for mineral acids, many organic acids, and complex metal acids. Extractions of some anionic complexes of Po, Pu, U, Zr, Hf, and Pa are demonstrated.

256 Simultaneous Complexometric Determination of Copper and Mercury. Keihei Ueno. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1668-1669.

An excess of EDTA is added to the sample; unreacted EDTA is back titrated with the standard Cu solution using murexide as an indicator. Potassium iodide is added to the titrated solution to decompose the mercury-EDTA chelate, and the liberated EDTA is again titrated with the standard Cu solution.

257 Nonaqueous Titration of 1,4-Disubstituted Piperazines. L. L. Ciaccio, S. R. Missan, W. H. McMullen, and T. C. Grenfell. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1670-1673.

Titrations were investigated in glacial acetic acid, acetonitrile, and nitromethane using perchloric acid in acetic acid as titrant.

258 Determination of Boron in Titanium Alloys by Ion Exchange Method. E. G. Newstead and J. E. Gulbierz. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1673-1674.

259 Determination of Higher Aliphatic Aldehydes in Presence of Ketones and Fatty Acids. L. D. Metcalfe and A. A. Schmitz. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1676-1678.

Aldehyde is oxidized to fatty acid with a mixture of 3% H_2O_2 and standard NaOH. The amount of standard alkali used is a measure of the aldehyde.

260 Densities and Refractive Indices for Glycol-Water Solutions: Triethylene Glycol, Dipropylene Glycol, and Hexylene Glycol. Tsu-Tao Chiao and A. Ralph Thompson. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1678-1681.

Analytical data which may be used for determining compositions of aqueous solutions.

261 Chloric Acid Method for Determining Protein-Bound Iodine by Use of Iodine-131. Jesse F. Goodwin, Richard B. Hahn, and A. J. Boyle. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1681-1684.

Addition of chromate to the sample is unnecessary. Protein-bound iodine can be separated from inorganic iodide by using either perchloric or trichloroacetic acid as a protein precipitant.

262 High Frequency Titration of Lead. Donald T. Sawyer and Paul S. Farrington. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1688-1690.

A rapid titration procedure for determination of Pb uses $K_2Cr_2O_7$ as titrant and a high frequency oscillator as an end point detector.

263 Voltammetry at Controlled Current. Automatic Recording at Solid Electrodes. Ralph N. Adams and John D. Voorhies. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1690-1694.

Automatic recording of current-scan polarograms gives very satisfactory results in voltammetry at controlled current. Using a three-electrode system, recorded polarograms are essentially free of *IR* distortion. Technique is an important and worth while approach to high resistance polarography.

264 Squalane. A Standard. Karl J. Sax and Fred H. Stross. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1700-1702.

Preparation and properties. Use as a standard for C-H, mol. wt., and viscosity determinations.

265 Automatic Recording Buret. Saul Gordon and Clement Campbell. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1706-1708.

Device provides for continuous graphic recording of changes in volume. Interchangeable metal bellows at bottom of buret measure pressure of height of liquid. Deflections of bellows are measured by a linear variable differential transformer.

266 Quantitative Method for the Automatic Application of Milliliter Quantities Onto Paper Chromatograms. Leo Levenbook. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1719-1720.

267* (German.) The I.R. Analysis of a Polymer Mixture. **Zur IR-Analyse eines Mischpolymerisates.** K. Ueberreiter and W. Krull. *Angewandte Chemie*, v. 69, Sept. 7, 1957, p. 557-561.

Quantitative analysis of a mixture of styrene and acenaphthylene using the characteristic absorption bands $\lambda_S = 6.87\mu$ and $\lambda_A = 12.22\mu$. The styrene band λ_S, contrary to the acenaphthylene band λ_A, does not depend on reciprocal link arrangement in the chain.

268* (German.) Identification of Uranium Fission Products by Means of Paper Chromatography. **Identifizierung von Uran-Spaltprodukten durch Papierchromatographie.** H. Götte and Doris Pätze. *Angewandte Chemie*, v. 69, nos. 18-19, Sept. 25, 1957, p. 608-614 + 1 plate.

Qualitative paper chromatography is possible by simple means, if the half lives of the radionuclides in question are more than five hours. The most important fission products of irradiated U can be identified by three chromatograms. Only simple solvents are required.

269* (German.) The Examination of Fuel Ashes by a Fast Analytical Method. **Analytische Schnellmethoden zur Untersuchung von Brennstoffasche. II.** Determination of Ca, Mg, Na, and K. **Bestimmung von Calcium, Magnesium, Natrium und Kalium.** W. Radmacher and W. Schmitz. *Brennstoff-Chemie*, v. 38, Sept. 1957, p. 270-274.

270 Colorimetric Method for the Determination of 3,4-Dichlorotetrahydrothiophene-1,1-Dioxide (PRD). H. P. Burchfield and Paul H. Schuldt. *Boyce Thompson Institute, Contributions*, v. 19, July-Sept. 1957, p. 77-86.

271 Spectrographic Solution Methods for the Analysis of Slags. S. Bergenfelt. *Henry Brutcher Translation No.* 3879, 14 p. (From *Jernkontorets Annaler*, v. 140, no. 1, 1956, p. 75-80; appendix, *ibid.*, v. 141, no. 4, 1957, p. 231-232.) Henry Brutcher, Altadena, Calif.

Description of two spectrographic solution procedures for iron- and steel-making slags. The first procedure is based on dissolution of powdered sample and cupric oxide in hydrochloric acid; a revolving graphite disk dipping into solution; and an a-c spark. The second procedure is based on fusion of powdered sample with borax; dissolution in citrate solution; graphite disk and a-c spark.

272 Determination of Nickel, Magnesium, Zinc, and Manganese in the Presence of Titanium by Titration With the Disodium Salt of Ethylenediamine Tetracetic Acid. B. M. Dobkina and E. P. Petrova. *Henry Brutcher Translation No.* 3917, 7 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 5, 1956, p. 525-527.) Henry Brutcher, Altadena, Calif.

Error does not exceed 5% in the least favorable case.

273 Determination of Potassium by Means of Tetraphenyl Sodium Borate. H. W. Berkhout and G. H. Jongen. *Henry Brutcher Translation No.* 3969, 7 p. (From *Chemisch Weekblad*, v. 51, Aug. 28, 1955, p. 607-608.) Henry Brutcher, Altadena, Calif.

Description of a micro-method for 0.5 to 5 mg. of K_2O in 10 ml. of solution, after precipitation as tetraphenyl potassium borate, by argentometry.

274 Spectroanalysis of Magnesite and Open-Hearth Lining Materials From Solutions. N. V. Kandler, A. V. Mitroshina, and I. L. Shmulenson. *Henry Brutcher Translation No.*

4020, 5 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 4, 1957, p. 440-441.) Henry Brutcher, Altadena, Calif.

A spectrochemical procedure for magnesia (20-95%) in magnesite and the material used for lining and repairing basic open-hearth bottoms.

275* (Italian.) Chromatographic Analysis of Formaldehyde-Acetaldehyde - Acrolein Mixtures. **L'analisi cromatografica delle miscele aldeide formica, acetica, acrilica.** Luisa Nebbia and Franco Guerrieri. *Chimica e l'Industria*, v. 39, Sept. 1957, p. 749-750.

Quantitative analysis by chromatography of the phenylhydrazones on partially hydrated MgO.

276* (French.) The Direct Determination of Oxygen in the Elementary Analysis of Organic Substances. **Le dosage direct de l'oxygène dans l'analyse élémentaire des substances organiques.** Roland Fort. *Chimie Analytique*, v. 39, Sept. 1957, p. 319-328.

A study of the direct methods of Schutze and Unterzaucher. The basic reaction: $2\ CO \rightleftarrows CO_2 + C$. Modification of the methods. Nitrogen purification. Carbon monoxide determination. (To be continued.)

277* (German.) The Reductometric Determination of Anthraquinone by Vanadium (II) - Sulfate. **Reduktometrische Bestimmung von Anthrachinon mittels Vanadium(II)-sulfat.** M. Matrka and Z. Ságner. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1131-1134.

Description of a new potentiometric method based on a quantitative reduction to anthrahydroquinone by means of vanadium (II)-sulfate solution.

278* (German.) Complexometry in Organic Analysis. **Die Komplexometrie in der organischen Analyse. IV.** Semimicro Determination of Nitro and Nitrose Groups. **Halbmikrobestimmung von Nitro- und Nitrosogruppen. V.** Determination of the Bond C=C by Means of Mercury (II)-Acetate. **Bestimmung von C=C-Bindungen mittels Quecksilber(II)-acetat.** B. Budesinsky. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1141-1152.

279* (German.) On the Quantitative Determination of Phenol and *o*-Cresol by Means of Paper Chromatography. **Über die quantitative Bestimmung von Phenol und *o*-Kresol mittels Papierchromatographie.** S. Hudeček and D. Beranová. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1153-1156.

Quantitative determination of free phenol and *o*-cresol in phenolic resins. Accuracy of the method is ± 5%.

280* (German.) Contribution to the Theory of Paper Chromatography of Inorganic Substances. **Ein Beitrag zur Theorie der Papierchromatographie anorganischer Substanzen. III.** Quantitative Solution of Frontal and Elutional Chromatograms. **Quantitative Lösung frontaler Chromatogramme und Elutionschromatogramme.** J. Bouzková, M. Hejtmánek, and I. Vavruch. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1219-1231.

Suggests a method of calculation of localization and distribution of a substance during paper chromatography. Calculated values are checked by experiments with two alkali metal chlorides.

281 Ring Analysis and Branching Analysis of Saturated Hydrocarbons. C. Boelhouwer and H. I. Waterman. *Fuel*, v. 36, Oct. 1957, p. 481-492.

A revised graphical method is proposed for the analysis of saturated hydrocarbon mixtures based solely on reliable physical data of pure *n*-alkanes, *n*-alkyl *cyclo*pentanes, and *n*-alkyl *cyclo*hexanes.

282 Determination of Zirconium in Plutonium by Ion Exchange and Spectrography. Roy Ko. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51831, Aug. 1957, 9 p. (UF767 Un3.1hw Contin.)

283 Spectrochemical Determination of Copper, Nickel, and Vanadium in Crude Petroleum. Kozo Nagashima and J. S. Machin. *Illinois State Geological Survey, Circular No.* 235, 1957, 10 p. (TN21 IL6.7c Vis.)

Method involves concentration of the metals in the ash from 100 grams of crude oil and converting the ash to a solution in dilute HCl. Determination is made by spectrographic means using a rotating electrode with high voltage spark excitation.

284* Radio - Frequency Analyzers for Laboratory and Plant. D. J. Fisher, M. T. Kelley, R. W. Stelzner, and E. B. Wagner, Jr. *ISA Journal*, v. 4, Oct. 1957, p. 474-477.

Accuracy, sensitivity, and stability of new continuous stream analyzer.

285 Flame Photometric Determination of Manganese, Iron, and Copper in Plant Material. A. D. Berneking and W. G. Schrenk. *Journal of Agricultural and Food Chemistry*, v. 5, Oct. 1957, p. 742-745.

Interfering ions were removed or separated through the use of an 8-hydroxyquinoline differential pH precipitation. A dry ashing technique was used in sample preparation. Comparison of the flame procedure with Association of Official Agricultural Chemists procedures showed good results.

286* Activation Analysis. Anil K. De. *Journal of Scientific & Industrial Research*, v. 16, sec. A, Aug. 1957, p. 337-339.

Nuclear particles such as neutrons, protons, and deuterons are used to produce radioactive isotopes by activation of the nuclei of the sample elements which are then detected and measured by their characteristic radiations. Method is specific since each induced radionuclide has its own particular decay constant and type of radiation.

287* (Russian.) On the Question of Application of Complexons in Chemical Analysis and Techniques. **K voprosu primeneniia kompleksonov v khimicheskom analize i tekhnike.** Iu. A. Bankovskii, A. F. Ievin'sh, and E. A. Luksha. *Latvijas PSR Zinātnu Akademijas Vestis*, 1957, no. 7, p. 113-118.

Effect of alkaline solutions of Complexon III (Trilon B) on various glasses, especially on optical and laboratory glass. The alkaline solutions of Complexon III have a more destructive effect on the glass than water with the same pH.

288 The Application of an Intermittent A.C. Arc Unit to the Analysis of Aluminium Alloys. J. H. Oldfield and E. A. R. Ferm. *Metallurgia*, v. 56, Oct. 1957, p. 205-209.

Use of a two-step filter ensures that adequate sensitivity for the determination of small concentrations of impurities is combined with a satisfactory order of reproducibility over a wide range of element concentrations.

289 High-Voltage Paper Electrophoresis of Inorganic Cations: Alkali, Alkaline-Earth and Other Metals. D. Gross. *Nature*, v. 180, Sept. 21, 1957, p. 596-598.

By application of a high-voltage technique with its attendant superior resolving power, the rapid, simultaneous separation of all the alkali metals (except ammonium) was found feasible.

290 New and Improved Analyses for Tri-N-Butyl Phosphate. Robert J. Allen and Michael A. DeSesa. *Nucleonics*, v. 15, Oct. 1957, p. 88 + 6 pages.

Description of acid or U saturation and ultraviolet spectrophotometric methods.

291* (Czech.) A Study of the Determination of Titanium in Coal Ashes. **Studie stanovení titanu v uhelných popelech.** Ferdinand M. Kessler and Libuše Dočkalová. *Práce Ústavu pro Výzkum a Využití Paliv*, v. 8, nos. 17-26, 1957, p. 188-213.

Polarographic and spectrophotometric procedures.

292* Potentiometric Acid-Base Titrations in Glacial Acetic Acid. Stanley Bruckenstein. *Record of Chemical Progress*, v. 18, Sept. 1957, p. 163-178.

293 Improved Low-Level Alpha-Scintillation Counter for Radon. Henry F. Lucas. *Review of Scientific Instruments*, v. 28, Sept. 1957, p. 680-683.

System is suitable for the analysis of samples of radon as small as 10^{-14} C or concentrations in air smaller than 10^{-10} C radon/liter.

294 Electron Probe X-Ray Microanalyzer. L. S. Birks and E. J. Brooks. *Review of Scientific Instruments*, v. 28, Sept. 1957, p. 709-712.

A simplified 1-3μ electron probe for X-ray spectrochemical analysis of metallic and non-metallic specimens.

295* (German.) Spectroscopic Determination of Iron, Titanium, Calcium, and Magnesium in Clays and Fire-Clays. **Beitrag zur spektroskopischen Bestimmung von Eisen, Titan, Kauzinium und Magnesium in Tonen und Schamotten.** Gerhard Dümecke and Joachim Wiegmann. *Silikattechnik*, v. 8, Aug. 1957, p. 324-328.

The main calibration curves obtained from test pieces are presented.

296* (English.) **The Infra-Red Absorption Spectra of Some Indole-3-Ketones.** E. M. Tanner. *Spectrochimica Acta*, v. 9, no. 4, 1957, p. 282-286.

Spectra were recorded in Nujol mulls and the NH and C=O stretching regions were re-examined in tetrahydrofuran solution.

297* (English.) **A Spectrographic Scheme for the Determination of Al, Ti, Fe, Ca, Mg, and Mn in Silicates.** B. J. Rushton and G. D. Nicholls. *Spectrochimica Acta*, v. 9, no. 4, 1957, p. 287-296.

Employs low-voltage d.c. anodic excitation in a carbon arc. The major elements are divided into two groups on the basis of volatility.

298* (English.) **The Spectrographic Determination of Boron in Graphite.** F. W. J. Garton. *Spectrochimica Acta*, v. 9, no. 4, 1957, p. 297-306.

A routine determination for the range of 0.2 to 1.5 p.p.m. is described.

299 Determination of Lithium Carbonate in Lithium Hydride. Jack W. Frazer and Carl W. Schoenfelder. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL 4918, Mar. 1957, 7 p. (UF767 U3u Contin.)

A capillary trap method was developed. The sample is hydrolyzed in constant boiling HCl and the evolved CO_2 measured as a gas. An accuracy of ± 0.01% by weight is obtained.

300 Research on a Method for Determining Boron in Low Boron Steels. C. T. Litsey, D. L. Chase, and E. J. Center. *Wright Air Development Center Aeronautical Research Laboratory, WADC Technical Report* 56-517, June 1957, 12 p. (TL 507 Un3.18w Vis.)

Method involves solution of the sample, adjustment of the acidity, passing the sample through an ion-exchange column of amberlite IR-120(H) resin, collecting the B solution which passes through the column, development of the color of B with carminic acid on an aliquot of the eluate, and measurement of the color intensity at 585 mμ. in a spectrophotometer.

301* (Russian.) Adsorption - Complexing Chromatographic Method of Separation of Metals. **Adsorbtsionno-kompleksoobrazovatel'nyi khromatograficheskii metod razdeleniia metallov.** A. M. Gurvich and T. B. Gapon. *Zavodskaia Laboratoriia*, v. 23, no. 9, Sept. 1957, p. 1037-1042.

Method based on utilization of adsorption and complex-forming columns, which can be used for solution of various problems of preparative, analytical, and physicochemical nature. Experiments with carbon-dimethylglyoxime and carbon-α-nitrose-β-naphthol columns.

302* (Russian.) Separation of Molybdenum From Iron, Aluminum and Calcium by Means of Anionites. **Otdelenie molibdena ot zheleza, aliuminiia i kal'tsiia s pomoshch'iu anionitov.** Iu. V. Morachevskii and M. N. Gordeeva. *Zavodskaia Laboratoriia*, v. 23, no. 9, Sept. 1957, p. 1066-1067.

A series of experiments on separation of Mo from Fe, Al, and Ca in HNO_3 and HCl solutions on anion-exchange resins. Results show that Mo practically completely separates from Fe, Al, and Ca in HNO_3 and that in HCl Mo can also be practically completely separated from elements of the second and third analytical groups.

303* (German.) "Fast Grey R. A." A New Colorimetric Reagent. **Fast Grey R. A., ein neues colorimetrisches Reagens. I.** Spectrophotometric Microdetermination of Zirconium. **Spektrophotometrische Mikrobestimmung von Zirkonium.** H. Khalifa and M. R. Zaki. *Zeitschrift für Analytische Chemie*, v. 158, no. 1, 1957, p. 1-7.

Determination of Zr concentration between 0.02 and 8 p.p.m. with a wavelength of 570 mμ. The cations Cu^{2+}, Ni^{2+} and Fe^{3+} interfered, but not U, Co, Al, Th, Bi, Zn, the alkalis or the rare earths.

304* (German.) Chelatometry. **Chelatometrie. XIV.** The Iron (III) Rhodanide Indicator. **Der Eisen (III)-rhodanid-Indicator.** Peter Wehber and Werner Johannsen. *Zeitschrift für Analytische Chemie*, v. 158, no. 1, 1957, p. 7-9.

Iron(III) ions were titrated with 0.1 M EDTA solution against rhodanide as indicator at pH 3.0-3.5. In the presence of a very high acetate ion concentration the titration results were independent of the indicator concentration.

305* (English.) **Titration of AsO_4^{3-} Ions With 0.1 M Magnesium Sulphate Solution in the Presence of Ca^{2+}, Mg^{2+}, Fe^{3+}, Cu^{2+} Ions and Some Other Foreign Substances.** E. Bakács-Polgár, L. Szekeres, and B. Láng. *Zeitschrift für Analytische Chemie*, v. 158, no. 1, 1957, p. 14-20.

See also: **49** (determination of Repellent R-11 in milk); **87** (determination of novobiocin); **88** (analysis of pharmaceuticals); **89** (determination of steroids); **147** (separation of valency states of metals); **162** (detection of radioactive materials in biological materials); **448** (differential thermal analysis); **785** (analysis of coal humic acids); **814** (chemical-streak tests on minerals).

CHEMISTRY—INORGANIC AND GENERAL

306 The Iodides of Thorium(III), (II) and (I). George W. Watt, D. M. Sowards, and S. C. Malhotra. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4908-4910.

Prepared by the reduction of Th (IV) iodide with excess elemental Th at 550 C.

307 Reactions of Triethyltin Hydride With Inorganic Halides and Oxides. Herbert H. Andersen. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4913-4915.

Three different explanations for some 25 reactions appear possible.

308 The Preparation and Properties of Vanadium Pentafluoride. L. E. Trevorrow, J. Fischer, and R. K. Steunenberg. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5167-5168.

Preparation by reaction of F with V metal at 300 C. Measurements of the vapor pressure of the liquid from 24.1 to 85.5 C resulted in a normal boiling point of 47.9 C. The melting point was 19.0 ± 0.9 C.

309 The Reaction of Sodium Hydride With Methyl Borate in Solvents. Convenient New Procedures for the Synthesis of Sodium Borohydride. Herbert C. Brown, Edward J. Mead, and Paul A. Tierney. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5400-5404.

310 Preparation of Highly Purified TiO_2 (Anatase). A. W. Czanderna, A. F. Clifford, and J. M. Honig. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5407-5409.

Spectroscopically pure TiO_2 was prepared by dissolving silica-free Ti metal in an ammoniacal solution of 90% H_2O_2. Common impurities, such as Fe, Mn, Mg, Sn, Ni, Al, and Ag were quantitatively removed by filtration.

311 Preparation and X-Ray Study of Niobium Pentaiodide. Robert F. Rolsten. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5409-5410.

312 A Study of the Reaction: $2UF_4 + O_2 \rightarrow UF_6 + UO_2F_2$. I. Side Reactions and Thermodynamics. L. M. Ferris. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5419-5421.

313 The Cyanide-1,10-Phenanthroline Complexes of Iron (II). Alfred A. Schilt. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5421-5425.

The visible absorption characteristics of these complexes and equilibria involved in their formation were studied.

314 A Fluorimetric Study of the Thorium-Morin System. Robert G. Milkey and Mary H. Fletcher. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5425-5435.

Thorium reacts with morin to yield a yellow complex that fluoresces when irradiated with ultra-violet light. The effect on the fluorescence of such variables as concentration of acid, alcohol, thorium, morin, and complex; time, temperature, and wave length of exciting light are studied to determine experimental conditions yielding maximum fluorescence.

315* Annotated Bibliography of Literature on Lithium Compounds in Inorganic Chemistry and Ceramic Technology. 145 p. Lithium Corporation of America, Inc., Minneapolis. (ZQD181.15 L71a Ref.)

316 The Chemistry of Carbonyl Sulfide. Robert J. Ferm. *Chemical Reviews*, v. 57, Aug. 1957, p. 621-640.

This first summary of the chemistry of COS to appear, covers the literature through vol. 49 of *Chemical Abstracts*.

317 Cesium Packaging Studies. Conversion of Cesium Zinc Ferrocyanide to a Cesium Chloride Product. J. L. Hepworth, E. D. McClanahan, Jr., and R. L. Moore. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-48832, June 1957, 32 p. (UF767 Un3.1hw Contin.)

Four processes for the conversion of Cs metal ferrocyanides to radiation stable compounds. Composition, crystal structure, and radiation stability measurements on cesium zinc ferrocyanide.

318* (Polish.) The Oxides and Hydroxides of Aluminum and Their Reciprocal Transformations. **Tlenki i wodorotlenki glinu i ich wzajemne przemiany.** Maksymilian Burk. *Wiadomości Chemiczne*, v. 11, no. 7, July 1957, p. 357-381.

Aluminum oxides of the α and γ series. Amorphous aluminum hydroxide and its aging and calcination products. Rehydration.

319* (German.) Chemistry of the Condensed Phosphates and Arsenates. **Zur Chemie der kondensierten Phosphate und Arsenate. XV.** A Dehydration of the Acid Phosphate of the Bivalent Ions of Mg, Mn, Fe, Co, Ni, Cu, Zn, Cd, and Hg and Its Products. **Produkte und Verlauf der Entwässerung saurer Phosphate der zweiwertigen Ionen des Mg, Mn, Fe, Co, Ni, Cu, Zn, Cd, und Hg. XVI.** Preparation of Condensed Phosphates of the Bivalent Ions of Ca, Sr, Ba, Pb, and of the Trivalent Ions of Al, Fe, Cr, and Bi by Means of Thermal Dehydration in the Free Atmosphere. **Die sich durch thermisches Entwässern an freier Atmosphäre bildenden kondensierten Phosphate der zweiwertigen Ionen des Ca, Sr, Ba und Pb und der dreiwertigen des Al, Fe, Cr und Bi.** Erich Thilo and Ingrid Grunze. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 290, July 1957, p. 209-237.

Thermal dehydration and preparation of condensed phosphates. Description of their structure, properties, and transformations.

320* (German.) The Chemical Transport Reactions. **Chemische Transportreaktionen. III.** Silicon Transport at Various Temperatures in the Presence of Silicon(II)-Halide and the Relation Between the Pressure and the Transport Direction. **Über den Transport von Silicium im Temperaturgefälle unter Mitwirkung der Silicium(II)-halogenide und über die Druckabhängigkeit der Transportrichtung.** Harald Schäfer and Bernhard Morcher. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 290, July 1957, p. 279-291.

Experimental study of Si transport by means of the gaseous dihalogens $SiCl_2$, $SiBr_2$ and SiI_2. It was observed that the Si travels with Cl and Br in the direction from high to low temperature. In the case of I, its transport direction depends from pressure: at low pressure it moves to the hot zone, and at high pressure, to the cold zone.

321* (Russian.) The Reaction of Titanium Tetrachloride With Tantalum, Niobium, and Aluminum Chlorides. **Vzaimodeistvie chetyrekhkhloristogo titana s khloridami tantala, niobiia i aliuminiia.** I. S. Morozov and D. Ia. Toptygin. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 8, Aug. 1957, p. 1915-1921.

Solubility of Ta, Nb, and Al chlorides in $TiCl_4$. It was found that the solubility of $TaCl_5$ and $NbCl_5$ is the same and increases in the presence of $AlCl_3$.

322* (Russian.) A Normal Titanium Sulfate. **O normal'nom sul'fate titana.** V. G. Chukhlantsev. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 9, Sept. 1957, p. 2014-2017.

A new method for preparation of the normal Ti sulfate was developed and its thermal dissociation studied. It was found that the decomposition of Ti sulfate starts at 150 C and occurs in two stages. At temperatures above 430 C Ti sulfate changes into the dioxide.

323* (Russian.) The Formation of a Complex Compound in the Titanium-Chromotropic Acid System. **K voprosu o kompleksoobrazovanii v sisteme titan-khromotropovaia kislota.** S. Ia. Shnaiderman. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 9, Sept. 1957, p. 2122-2125.

Study of compounds formed by reaction of Ti salts and chromotropic acid in solutions having different acidity.

324* (Russian.) Equilibrium in the Silicotungstic and Silicomolybdic Acid-Water Systems. **Ravnovesiia v sistemakh iz kremnevol'framovoi i kremnemolibdenovi kislot i vody.** E. A. Nikitina and O. N. Sokolova. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 9, Sept. 1957, p. 2231-2234.

Solubility of the silicotungstic acid hydrates with 16 and 22 molecules of H_2O and silicomolybdic acid with 10 and 24 molecules of H_2O.

CHEMISTRY—ORGANIC

325* (English.) **On the Reaction Between Urea and Formaldehyde in Neutral and Alkaline Solutions. VII. A Spectrophotometrical Method for Quantitative Determination of Urea and Methylol Ureas of the Reaction Mixture. VIII. Studies of the Reactions and Equilibria at Formaldehyde-Urea Molecular Ratios in the Range 1.4-2.0. IX. The Influence of Methanol on the Rates of Reaction. X. Notes on the Reaction Mechanism.** Nils Landqvist. *Acta Chemica Scandinavica*, v. 11, no. 5, 1957, p. 776-803.

326* (English.) **On the Oxidation of Benzidine and *o*-Dianisidine With Hydrogen Peroxide and Acetylcholine in Alkaline Solution.** Gunnar Aksnes and Kjell Sandberg. *Acta Chemica Scandinavica*, v. 11, no. 5, 1957, p. 876-880.

From benzidine one oxidation product was isolated and shown to be identical with synthesized 4-amino-4'-nitrobiphenyl. From the oxidation of *o*-dianisidine three compounds were isolated.

327 Organic Compounds of Uranium. VII. Uranyl Alkoxides and Dithiocarbamates. R. G. Jones, E. Bindschadler, G. A. Martin, Jr., J. R. Thirtle, and H. Gilman. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4921-4922.

Several uranyl dialkyldithiocarbamates, uranyl ethoxide, and a compound thought to be uranyl *t*-butoxide are described.

328 γ-Ray Initiated Reactions. I. The Addition of Bromotrichloromethane to Alkenes. El-Ahmadi I. Heiba and Leigh C. Anderson. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4940-4944.

One-substituted alkenes gave 1:1 addition products, but cyclic alkenes revealed beside the 1:1 addition products the corresponding 1,2-dibromo- and the 1,2-ditrichloromethyl compounds.

329 An Oxygen-18 Tracer Study of the Rearrangements of 2-Phenyl-1-Propyl *p*-Bromobenzenesulfonate and 2-*p*-Methoxyphenyl-1-Propyl *p*-Toluenesulfonate. Donald B. Denney and Bernard Goldstein. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4948-4951.

330 High Pressure Thermal Alkylation of Monoalkylbenzenes by Simple Olefins. Herman Pines and Joseph T. Arrigo. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4958-4967.

Above were studied in a flow-type system at 420 atm. pressure and in the temperature range of 400 to 485 C.

331 The Potassium-Catalyzed Reaction of Olefins With Arylalkanes. Luke Schaap and Herman Pines. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4967-4970.

332 The Benzoylation of Cyclopentadienyllithium. William J. Linn and William H. Sharkey. *American Chemical Society, Journal,* v. 79, Sept. 20, 1957, p. 4970-4972.

Above react with aromatic acid chlorides to give products in which the cyclopentadiene ring is substituted with two aroyl groups in the 1- and 5-positions.

333 Thermal Condensation of Formaldehyde With Acyclic Olefins. A. T. Blomquist, M. Passer, C. S. Schollenberger, and Joseph Wolinsky. *American Chemical Society, Journal,* v. 79, Sept. 20, 1957, p. 4972-4976.

334 1,1-Difluoroallene. A. T. Blomquist and Daniel T. Longone. *American Chemical Society, Journal,* v. 79, Sept. 20, 1957, p. 4981-4982.

The above was prepared from 1,3-dibromo-1,1-difluoropropane obtained from the free radical-catalyzed addition of dibromodifluoromethane to ethylene.

335 Cyclopropene. I. The Reaction of 2-Bromocyclopropanecarboxylates With Potassium *t*-Butoxide. Kenneth B. Wiberg, Robert K. Barnes, and Jerry Albin. *American Chemical Society, Journal,* v. 79, Sept. 20, 1957, p. 4994-4999.

336 Flue-Cured Tobacco. II. Neophytadiene. R. L. Rowland. *American Chemical Society, Journal,* v. 79, Sept. 20, 1957, p. 5007-5010.

Study of extracted ether-soluble materials. Neophytadiene was shown to be 3-methylene-7,11,15-trimethyl-1-hexadecene.

337 Studies on the Decarboxylation of Oxidized Cellulose Acetate Through the Formation of the Acid Chloride From the Carboxyl Group and Its Reaction With Silver Oxide and Bromine. F. A. H. Rice and Arthur Russell Johnson. *American Chemical Society, Journal,* v. 79, Sept. 20, 1957, p. 5049-5055.

338 Alkenylboranes. I. Preparation and Properties of Some Vinyl- and Propenylboranes. T. D. Parsons, M. B. Silverman, and D. M. Ritter. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5091-5098.

Dimethylvinyl-, methyldivinyl- and trivinylborane, dimethylpropenyl- and methyldipropenylborane were prepared from dimethylbromoborane and vinylsodium or propenyllithium, respectively.

339 Rates of Chlorination of Benzene, Toluene and the Xylenes. Partial Rate Factors for the Chlorination Reaction. Herbert C. Brown and Leon M. Stock. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5175-5179.

340 Organoboron Compounds. II. Preparation and Properties of Some Trialkylboroxines. III. Preparation and Properties of Alkyldichloroboranes. IV. Phenyldifluoroborane and Other Aryldihalogenoboranes. V. Electric Moments of Some Alkyl- and Aryldihalogenoboranes in Benzene and Dioxane. VI. Isomerization of Boranes Containing Secondary and Tertiary Alkyl Groups. VII. Dialkylchloroboranes From the Reaction of Boron Chloride With Trialkylboranes. Disproportionation of Dialkylchloroboranes. VIII. The Reaction of Triorganoboranes With Boric Oxide. P. A. McCusker, et. al. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5179-5196.

341 Evidence for General Base Catalysis in an Ester Hydrolysis. I. Hydrolysis of an Alkyl Aminoacetylsalicylate. Edward R. Garrett. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5206-5209.

The protonated salicylate di-ester, methyl pyrrolidylacetylsalicylate hydrochloride is completely resistant to H ion catalyzed hydrolysis but is highly susceptible to general base catalysis as by water, hydroxyl and acetate ions. The effect of acetate ion on hydrolysis greatly exceeds ionic strength effects and is strong evidence of postulated general base catalysis.

342 Synthesis of 2-Cyclohexene-1-Glycine and 1-Cyclohexene-1-Alanine, Inhibitory Amino Acid Analogs. Jerome Edelson, Prabhat R. Pal, Charles G. Skinner, and William Shive. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5209-5212.

Compounds were synthesized through the condensation of acetamidocyanoacetic ester and the appropriate halide followed by alkaline hydrolysis.

343 The Thiamin-Pyruvate Reaction. K. Fry, L. L. Ingraham, and F. H. Westheimer. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5225-5227.

Proof that the methylene group between the pyrimidine and thiazole rings in thiamin does not ionize during the thiamin-catalyzed decarboxylation of pyruvate.

344 Indazole Analog of Tryptamine. A New Synthesis of Indazoles. C. Ainsworth. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5242-5245.

Synthesis involving the dehydrogenation of readily available tetrahydroindazoles, application to the preparation of 3 β-aminoethylindazole dihydrochloride.

345 Amine Oxides. I. Gramine Oxide. David W. Henry and Edward Leete. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5254-5256.

Synthesis and properties.

346 Derivatives of Thiazolethiols. John J. D'Amico, Marion W. Harman, and R. H. Cooper. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5270-5276.

Preparation and characteristics of 74 compounds.

347 Identification and Synthesis of 4,17-Pregnadien-20-ol-21-al-2,11-Dione Acetate. R. E. Beyler and Frances Hoffman. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5297-5300.

348 The Synthesis of Various 3-Substituted-4-Alkylcoumarins. Charles Wiener, Collin H. Schroeder, and Karl Paul Link. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5301-5303.

Data on 46 compounds.

349 Free Radical-Initiated Reactions of Acetylene With Thiols and Carbon Monoxide. J. C. Sauer. *American Chemical Society, Journal,* v. 79, Oct. 5, 1957, p. 5314-5315.

3-Alkylthiopropenals were prepared in modest yields by the free radical-initiated reaction of an alkyl thiol, acetylene, and CO. Aryl thiols reacted similarly but in poor yield. An important concurrent reaction is the interaction of the acetylene with the thiol to give a 1,2-disulfide, a reaction which takes place in high yield in the absence of CO.

350 Steric Effects on the Base Strengths of Cyclic Amines. H. K. Hall, Jr. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5444-5447.

A series of 1- and 2-methyl derivatives of piperidine exhibiting a wide variation in degree of steric hindrance was prepared. Their base strengths in water and in acetonitrile were measured. Those of the tertiary amines rose markedly as the degree of substitution increased, but those of the secondary amines rose only slightly.

351 Studies of Some Nitro-Substituted Benzhydrylcarbonium Ions. Burch B. Stewart and Hilton A. Smith. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5457-5460.

4-Nitrobenzhydrol, bis-(3-nitrobenzhydryl) ether, and 3,3'-dinitrobenzhydrol were studied in 100% H_2SO_4. The first two gave carbonium ions which were rather unstable and readily polymerized. The last gave no visible carbonium ion but did yield a soluble polymer.

352 Hydrogenolysis by Metal Hydrides. I. Hydrogenolysis of Aryl Allyl Ethers by Lithium Aluminum Hydride. Virgil L. Tweedie and Michael Cuscurida. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5463-5466.

353 The Chemistry and Synthetic Applications of the Phenanthridinone System. Henry Gilman and John Eisch. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5479-5483.

System could be chlorinated, iodinated, and sulfonated readily at the 2-position. A nitro group could be introduced easily into the 4-position only if the 2-position was blocked. The N-methylation of certain electronegatively substituted phenanthridinones was accomplished by heating their K salts with CH_3I in ethanol.

354 Disproportionation of Alkylbenzenes. II. Rearrangement of the *n*-Propyl Group in Treatment of *n*-Propyl-β-C^{14}-Benzene With Aluminum Chloride. Royston M. Roberts and Stanley G. Brandenberger. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5484-5488.

355 Reactions of Naphthoquinones With Malonic Ester and Its Analogs. IV. A Synthesis of 2,3-Disubstituted-4,5-Phthaloylfurans. Ernest F. Pratt and Rip G. Rice. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5489-5493.

356 Methylene Derivatives as Intermediates in Polar Reactions. VIII. Difluoromethylene in the Reaction of Chlorodifluoromethane With Sodium Methoxide. Jack Hine and John J. Porter. **IX. The Concerted Mechanism for α-Eliminations of Haloforms.** Jack Hine and Paul B. Langford. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5493-5500.

357 Synthesis of 1-Phenylpropane Derivatives. I. Takeshi Matsumoto and Kunio Hata. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5506-5508.

A novel stereospecific route for DL-*threo*-2-amino-1-phenyl-1-chloro-propane-3-ol and DL-norephedrine.

358 Aminolysis Products of 1-Chloro-2-Hydroxy-3-Butene, 1-Hydroxy-2-Chloro-3-Butene and 1,2-Epoxy-3-Butene. F. F. Blicke and John H. Biel. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5508-5512.

359 Rearrangement of 2,4,6-Trimethylbenzyltrimethylammonium Ion by Sodium Amide to Form an *exo*-Methylenecyclohexadieneamine and Its Reactions. Charles R. Hauser and Donald N. Van Eenam. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5512-5520.

360 Tertiary Hydroxyl Group Elimination in Steroid Ketols. R. S. Rosenfeld. *American Chemical Society, Journal,* v. 79, Oct. 20, 1957, p. 5540-5542.

361 Fat Splitting by the Twitchell Process at Low Temperature. Kazuo Fukuzumi and Yoshito Koyama. *American Oil Chemists' Society, Journal,* v. 34, Oct. 1957, p. 500-503.

Study of the degree of splitting of coconut and soybean oils by this process at 35 ± 0.1 C. with no shaking or stirring, using an agent consisting of tetrabutyl naphthalene sulfonic acid with water or dilute H_2SO_4.

362 Synthetic Detergents From Animal Fats. X. Sulfated, Ethenoxylated Tallow Alcohols. R. G. Bistline Jr., A. J. Stirton, J. K. Weil, and E. W. Maurer. *American Oil Chemists' Society, Journal,* v. 34, Oct. 1957, p. 516-518.

Determined the minimum number of ethenoxy groups required for improved solubility while retaining excellent detergency characteristics.

363 Studies in the Wagner-Meerwein Rearrangement. II. F. A. L. Anet and P. M. G. Bavin. *Canadian Journal of Chemistry,* v. 35, Oct. 1957, p. 1084-1087.

Dibenz[*b,f*]oxepin and its 10-methyl derivative were prepared by ring expansion of suitable xanthene derivatives. 2-Fluorophenanthrene was synthesized from 2-fluorofluorene.

364 Preparation of Distilbene (1,2,3,4-Tetraphenylcyclobutane). J. M. Morton, E. A. Flood, and N. F. H. Bright. *Canadian Journal of Chemistry,* v. 35, Oct. 1957, p. 1097-1101.

The reaction between benzyl chloride and potassium amide in liquid ammonia yields, in addition to stilbene as the main product, considerable quantities of 1,2,3,4-tetraphenylcyclobutane.

365 The Kolbe-Schmitt Reaction. Alan S. Lindsey and Harold Jeskey. *Chemical Reviews,* v. 57, Aug. 1957, p. 583-620.

Comprehensive review covers papers published through January 1956.

366 The Tetrahydrophthalic Acids. Robert E. Buckles. *Chemical Reviews,* v. 57, Aug. 1957, p. 641-663.

Concerns mainly the chemical and physical properties of the isomeric tetrahydrophtahalic acids and their derivatives, especially the anhydrides, imides, and esters. Literature is covered through 1954.

367 Extrusion of Sulphur. I. Formation of Phenanthrenes From Dibenzol[b,f]Thiepins. J. D. Loudon, A. D. B. Sloan, and L. A. Summers. **II. A New Route to Phenanthridine Derivatives.** A. D. Jarrett and J. D. Loudon. *Chemical Society, Journal,* 1957, Sept., p. 3814-3823.

368 The Preparation and Properties of Di-*n*-Butylboronous Anhydride. W. Gerrard, M. F. Lappert, and R. Shafferman. *Chemical Society, Journal,* 1957, Sept., p. 3828-3833.

369 The Catalytic Toxicity of Nitrogen Compounds. I. Toxicity of Ammonia and of Amines. E. B. Maxted and M. S. Biggs. *Chemical Society, Journal,* 1957, Sept., p. 3844-3847.

The toxicity of ammonia towards Pt in the catalytic hydrogenation of cyclohexene, and suppression of this toxicity by small concentrations of water.

370 Synthetic Applications of Activated Metal Catalysts. IV. The Formation of Dimeric Products During Desulphurisations. G. M. Badger and W. H. F. Sasse. *Chemical Society, Journal,* 1957, Sept., p. 3862-3867.

Desulfurization of thiophen derivatives with W-7 Raney Ni yields small amounts of dimeric products in addition to the expected monomeric compounds. The yield of dimeric product depends on concentration of the thiophen derivative in the reaction mixture, time of contact with the catalyst, and H content.

371 Radical Exchange in Organometallic Compounds. II. Replacement of Trifluoromethyl by Methyl. R. N. Haszeldine and B. O. West. *Chemical Society, Journal,* 1957, Sept., p. 3880-3884.

372 Steroid Sulphates. I. Some Solvolytic Reactions of the Salts of Steroid Sulphates. Jean McKenna and J. K. Norymberski. *Chemical Society, Journal,* 1957, Sept., p. 3889-3900.

373 The Reaction of *o*-Bromoiodobenzene With Magnesium and Lithium. Harry Heaney, Frederick G. Mann, and Ian T. Millar. *Chemical Society, Journal,* 1957, Sept., p. 3930-3938.

374 The Synthesis and Properties of 4-Methyl-*o*-Phenylenebis(Diethylphosphine). F. A. Hart and F. G. Mann. *Chemical Society, Journal,* 1957, Sept., p. 3939-3944.

375 The Preparation and Quaternisation of *o*-Dimethylamino-Phenyldiethylphosphine and an Analogous Arsine. Frederick G. Mann and H. R. Watson. *Chemical Society, Journal,* 1957, Sept., p. 3945-3949.

376 Pteridine Derivatives. IV. The Formation of 8-Alkyl-2:8-Dihydro-2-Oxopteridines. W. E. Fidler and H. C. S. Wood. *Chemical Society, Journal,* 1957, Sept., p. 3980-3984.

Preparation by condensation of 5-amino-2-hydroxy-4-methylaminopyrimidine with 1:2-diketones. These compounds have a *para*-quinonoid type of structure.

377 The Relative Stabilising Influences of Substituents on Free Alkyl Radicals. III. The Cleavage of Monosubstituted Dibenzyl Ethers by Grignard Reagents in the Presence of Cobaltous Chloride. R. L. Huang and Sing Sow Si-Hoe. *Chemical Society, Journal,* 1957, Sept., p. 3988-3993.

378 The Reactions of Some 1:4-Dicarbonyl Systems With Hydrazine. W. L. Mosby. *Chemical Society, Journal,* 1957, Sept., p. 3997-4003.

3:4-Diacetylhexane-2:5-dione and hydrazine yield pyrazole derivatives, whereas diacetylsuccinic ester gives both pyrazolinones and pyridazines.

379 The Direct Introduction of the Diazonium Group Into Aromatic Nuclei. I. The Basic Reaction, Yielding Diazonium Salts From Polyalkylbenzenes, Phenol Ethers, Phenols, and Aromatic Tertiary Amines. II. Diazonium Salts From Aromatic Sulphonic Acids, Carboxylic Acids, and Nitro-Compounds Prepared by Use of Mercuric Ions as Catalyst. J. M. Tedder and G. Theaker. *Chemical Society, Journal,* 1957, Sept., p. 4003-4012.

380 Reactions of Organic Azides. VII. Ring Expansion via Azides: 1:2- and 7:8-Benzophenanthridine and 9-Phenylphenanthridine. The Hydrazoic-Sulphuric Acid Reaction With Indene. C. L. Arcus, R. E. Marks, and M. M. Coombs. *Chemical Society, Journal,* 1957, Sept., p. 4064-4069.

381 Perfluoroalkyl Derivatives of Sulphur. VII. Alkyl Trifluoromethanesulphonates as Alkylating Agents, Trifluoromethane-Sulphonic Anhydride as a Promoter for

Esterification, and Some Reactions of Trifluoromethanesulphonic Acid. T. Gramstad and R. N. Haszeldine. *Chemical Society, Journal*, 1957, Sept., p. 4069-4079.

A general study of the reactions of the strong, stable, and non-oxidizing trifluoromethanesulphonic acid.

382 Alkylation of the Aromatic Nucleus. I. The Introduction of *sec.*-Alkyl and *cyclo*Hexyl Groups by Reaction With Esters of Toluene-p-Sulphonic Acid. W. J. Hickinbottom and N. W. Rogers. *Chemical Society, Journal*, 1957, Sept., p. 4124-4130.

The *cyclo*hexyl group was introduced smoothly into the aromatic nucleus of toluene, m- and p-xylene, mesitylene, naphthalene, phenol, and anisole by heating the aromatic compound with *cyclo*hexyl toluene-p-sulfonate. *iso*propyl and sec.-butyl sulphonates react similarly.

383* (German.) On Dextran. **Über Dextran. II.** Determination of Mean Value of Molecular Weight of Partially Degraded Dextran by Means of the Iodometric Method. **Die Bestimmung des Zahlendurchschnittes des Molekulargewichtes von teilweise abgebautem Dextran mittels der jodometrischen Methode. III.** The Influence of Salts on the Solubility of Partially Degraded Dextran in Water-Alcohol Solutions. **Der Einfluss von Salzen auf die Löslichkeit teilweise abgebauten Dextrans in Wässrig-alkoholischer Lösung.** L. Lacko and J. Málek. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1106-1113.

384* (German.) Synthesis of *trans*-$\Delta^{6,7}$-Octahydroisoquinoline. **Synthese von *trans*-$\Delta^{6,7}$-Oktahydroisochinolin.** S. Heřmánek and J. Trojánek. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1157-1161.

Five-step synthesis of racemic *trans*-$\Delta^{6,7}$-octahydroisoquinoline from butadiene and methyl ether of glutaconic acid. Production of racemic *trans*-decahydroisoquinoline using the same method.

385* (German.) Some New Derivatives of β,β,β-Trichlor-α,α-bis-(4-Hydorphenyl)-Ethane. **Einige neue Derivate des β,β,β-Trichlor-α,α-bis-(4-oxyphenyl)-äthans.** M. Trojna and J. Hubáček. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1162-1166.

Sulfuration, nitration, and bromination of β,β,β-trichlor-α,α-bis-(4-hydrophenyl)-ethane, and partial and complete dehalogenation of the derivatives obtained.

386* (German.) The Reaction of N-Alkoxymethylpolycaprolactam With Thiocarbamide. **Die Reaktion des N-Alkoxymethylpolycaprolactams mit Thioharnstoff.** J. Dvořák and J. Zdražil. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 4, Aug. 1957, p. 1167-1172.

Effect of temperature, duration of condensation, and behavior of reacting components on the reaction. Determination of constant value of equilibrium at 20 C.

387* (Russian.) Alkylation of α- and β-Naphtols by Acetylene. **Alkilirovanie atsetilenom α- i β-naftolov.** V. L. Vaiser. *Doklady Akademii Nauk SSSR*, v. 115, no. 1, July 1, 1957, p. 91-93.

Alkylation of naphthol in the presence of $H_3PO_4 \cdot BF_3$ catalyst produced an alkylate which dissolves in acetone, acetic acid, ether, and chloroform; dissolves with difficulty in benzene; could be dissolved when heated in carbon tetrachloride and N-heptane; and is insoluble in alkali and H_2SO_4. Boiling point is 173 C; mol. wt. is 296-301.

388* (Russian.) Conjugate Decarboxylation on the Autooxidation of Isopropylbenzene in a Mixture With Fatty Acids. **Sopriazhennoe dekarboksilirovanie pri avtookislenii izopropilbenzola v smesi s zhirnymi kislotami.** N. I. Mitskevich, T. I. Soroka, and B. V. Erofeev. *Doklady Akademii Nauk SSSR*, v. 115, no. 1, July 1, 1957, p. 103-106.

Conjugated decarboxylation of acetic, butyric, isobutyric, and stearic acids during the autooxidation of isopropylbenzene in a mixture with the above acids was studied.

389* (Russian.) Formation of Polymeric Hydrocarbons by Decomposition of Aliphatic Diazocompounds. **Ob obrazovanii polimernykh uglevodorodov pri raspade alifaticheskikh diazosoedinenii.** V. V. Korshak and V. A. Sergeev. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 308-311.

Disintegration reactions of diazomethane, diazoethane, diazotoluene, diazodiphenylmethane, and their mixtures in the presence of metallic Cu and certain B compounds.

390* (Russian.) Synthesis of Some Alkylhaloid Silanes and Silicon Hydrocarbons. **Sintez nekotorykh alkilgaloidsilanov i kremniiuglevodorodov.** A. V. Topchiev, N. S. Nametkin, and T. I. Chernysheva. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 326-329.

Reaction of Si compounds containing the Si-H bond with olefin hydrocarbons. Preparation of Si hydrocarbons by the reaction of organolithium compounds with organosilicon halogen derivatives.

391* (Russian.) The Kinetic Method of Studying the Cracking of Propane by Means of Labeled Atoms. **Kineticheskii metod primeneniia mechennykh atomov pri issledovanii krekinga propana.** M. B. Neiman, N. I. Medvedeva, and E. S. Torsueva. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 347-350.

Behavior of ethylene marked with C-14. Study of cracking of propane at 530 to 580 C.

392* Studies on the Nature of the Racemic Modifications of Optically Active Compounds in the Solid State. XIII. Camphor-β-Sulphonyl *o*-, *m*- and *p*-Nitro-Phenylamides (*d*- and *dl*-), Camphor-β-Sulphonyl *o*-, *m*- and *p*-Phenylene Diamines (*d*- and *dl*-) and *o*-, *m*- and *p*-Phenylene-*bis*-Camphor-βSulphonylamides (*d*- and *dl*-). Bawa Kartar Singh and Shiva Mohan Verma. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Aug. 1957, p. 112-119.

Of the nine racemic forms, five are true *dl*-compounds varying in their stability, and the remaining four form solid solutions.

393* (Russian.) Synthesis of 1-*n*-Hexamethylvinylethylsiloxanes. **Sintez 1-*n*-geksametilviniletilsiloksanov.** K. A. Andrianov and N. A. Kurasheva. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 8, Aug., p. 956-961.

Synthesis of the linear siloxanes by the cohydrolysis of vinylethyldichlorosilane with trimethylchlorosilane; their viscosities from −15 to +120 are reported.

394 The Dealkylation of Alkyl Aromatic Hydrocarbons. II. The Dealkylation of Coal Tar Naphthas. W. D. Betts, F. Popper, and R. I. Silsby. *Journal of Applied Chemistry*, v. 7, Sept. 1957, p. 497-503.

395 The Oxidation Potentials of Phenolic and Amino Antioxidants. G. E. Penketh. *Journal of Applied Chemistry*, v. 7, Sept. 1957, p. 512-521.

A simple and rapid polarographic method of measuring the relative oxidation potentials of organic compounds was developed, and values for a large number of phenolic and amino compounds were determined. In general, as the oxidation potential decreases, the antioxidant activity increases.

396 Phenol-Formaldehyde and Allied Resins. IV. Rational Synthesis of Hexanuclear and Heptanuclear Novolaks. A. C. Davis, B. T. Hayes, and R. F. Hunter. **V. Synthesis of a Bridged Decanuclear Novolak and a Case of Hardening by Way of *meta*-Substitution.** R. F. Hunter and C. Turner. *Journal of Applied Chemistry*, v. 7, Sept. 1957, p. 521-532.

397 Iminotetrazolinium Salts. Identification of Sulfonic Acids. Robert M. Herbst and K. G. Stone. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1139-1142.

Tartrates of several 1-alkyl-4-benzyl-5-iminotetrazolines are described. Excepting 1-*n*-octyl-4-*p*-nitrobenzyl-5-iminotetrazoline which forms an acid tartrate, the bases combine with two moles of tartaric acid to form hydrated complex tartrates.

398 Apparent Acidic Dissociation of Some 5-Aryltetrazoles. Robert M. Herbst and Kenneth R. Wilson. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1142-1145.

A procedure for preparation from solutions of the aryl cyanides, sodium azide, and acetic acid in *n*-butyl alcohol heated under reflux. The isomeric 5-chlorophenyl-, 5-bromophenyl-, and 5-methoxyphenyltetrazoles were prepared, and their apparent acidic dissociation constants and ultra-violet absortpion spectra determined.

399 Bicyclo [3.1.0]Hexane Derivatives. I. Synthesis of Bicyclo[3.1.0]-2-Hexanone and Methyl Bicyclo[3.1.0]Hexane-1-Carboxylate. Norman A. Nelson and George A. Mortimer. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1146-1153.

400 Structure and Properties of Cyclic Compounds. X. Dissociation Constants of Cyanohydrins of Some Bridged-Ring Ketones. O. H. Wheeler, R. Cetina, and J. Z. Zabicky. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1153-1156.

The constants for the cyanohydrins of norcamphor and dehydronorcamphor and of a number of methyl derivatives of the former have been measured.

401 The Reaction of Ketones With Peroxides in Alkaline Solution. Herbert O. House and Richard L. Wasson. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1157-1160.

The reaction of 2-methyl-3-phenyl-2-cyclopentenone with alkaline hydrogen peroxide yielded β-hydroxypropiophenone. The cleavage of four ketones, butyrophenone, 2-pentanone, 2-octanone, and 2-methyl-3-hexanone, with sodium hydroperioxide was studied. A possible explanation for the results is suggested.

402 Reaction of Peroxyacetic Acid With α-Arlkylidenecyclanones. Henry M. Walton. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1161-1165.

Reaction with α-aralkylidenecyclopentanones and α-aralkylidenecyclohexanones in acetic acid media of different acidity resulted in the intrusion of an O atom between the carbonyl and methylidene carbon atoms, with the formation of new 5-enoic-5-hydroxy acid δ-lactones and 6-enoic-6-hydroxy acid ε-lactones.

403 Preparation and Stability of Some Organolithium Compounds in Tetrahydrofuran. Henry Gilman and Bernard J. Gaj. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1165-1168.

Methyl-, *n*-butyl-, and phenyllithium were prepared by the interaction of methyl chloride, *n*-butyl chloride, n-butyl bro mide, and bromobenzene, respectively, with Li wire. The order of stability was found to be: methyl>phenyl>*n*-butyllithium.

404 The Dinitriles of Acetylenedicarboxylic and Polyacetylenedicarboxylic Acids. I. Dicyanoacetylene and Dicyanodiacetylene. Andrew J. Saggiomo. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1171-1175.

Syntheses are described. Pure C_4N_2 is stable at room temperature in the absence of O.

405 Selenium-Catalyzed Isomerization of *cis*-Stilbene. J. D. Fitzpatrick and Milton Orchin. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1177-1179.

The isomerization of *cis* to *trans*-stilbene can be achieved by elemental Se at 200 to 210 C. The reaction is homogeneous and depends upon the formation and decomposition of a *pi* complex between Se and the stilbene.

406 Ester Interchange Reactions of Long Chain Thiol Esters. George S. Sasin, Paul R. Schaeffer, and Richard Sasin. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1183-1184.

Ethanethiol esters of lauric, myristic, palmitic, and stearic acids undergo ester interchange reactions with alkanethiols, arylthiols, alcohols, and phenol.

407 Synthesis and Properties of the Six Thioxylenol Isomers. E. A. Bartkus, E. B. Hotelling, and M. B. Neuworth. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1185-1186.

Six dimethylthiophenol isomers were synthesized and oxidized to the corresponding disulfides.

408 Azulene. VI. Synthesis and Properties of Some 1,3-Disubstituted Azulenes. Arthur G. Anderson, Jr., Ralph Scotoni, Jr., E. J. Cowles, and Charles G. Fritz. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1193-1196.

409 Preparation of Some Vinylsilanes With Vinylmagnesium Chloride. Sanders D. Rosenberg, John J. Walburn, Theodore D. Stankovich, Allen E. Balint, and Hugh E. Ramsden. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1200-1202.

410 Arylmagnesium Chlorides. Preparations and Characterizations. Hugh E. Ramsden, Allen E. Balint, William R. Whitford, John J. Walburn, and Robert Cserr. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1202-1206.

Substitution of tetrahydrofuran for ethyl ether allows conversion of aryl chlorides to arylmagnesium chlorides.

411 Reduction of Methyl Benzoyldiazoacetate. A New Synthesis of Allophenylserine. J. H. Looker and Donald N. Thatcher. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1233-1237.

Synthesis of allophenylserine (DL-*erythro*-β-phenylserine) by catalytic reduction.

412 Chloracetates and Dichloroacetates of Flavonol, 7-Hydroxyflavone, and Chrysin. J. H. Looker and Walter W. Hanneman. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1237-1239.

An improved synthesis of 7-chloroacetoxyflavone is applied to the preparation of 7-dichloroacetoxyflavone, 3-chloroacetoxyflavone, and 7-dichloroacetychrysin.

413 Tribenzotropone From a 1,3-Rearrangement. Martin Stiles and Arthur J. Libbey, Jr. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1243-1246.

414 Phenazines. G. A. Swan and D. G. I. Felton. 693 p. 1957. Interscience Publishers, New York. (QD331 C42)

Synthesis, structure, properties, and reactions of phenazine and its derivatives.

415* Recent Advances in Sesquiterpenoid Chemistry. D. H. R. Barton and P. de Mayo. *Quarterly Reviews*, v. 11, no. 3, 1957, p. 189-211.

416* Unsolved Problems in Flavonoid Chemistry. T. S. Wheeler. *Record of Chemical Progress*, v. 18, Sept. 1957, p. 133-161.

Structure, synthesis, reactions, and properties of numerous compounds.

417* (Polish.) The Oxidation of Petroleum Hydrocarbons. **Utlenianie węglowodorów naftowych.** Urszula Szalajko. *Wiadomości Chemiczne*, v. 11, June 1957, p. 285-318.

Theory; oxidation mechanism; products. Effect of temperature, time, oxide concentration, catalyst, and oxidizing medium. Hydrocarbon structure. Industrial applications.

418 Spiranes and Other Rigid Molecules. D. J. Cram. *Wright Air Development Center Aeronautical Research Laboratory, WADC Technical Report* 56-540, June 1957, 84 p. (TL507 Un3.18w Vis.)

Chemistry of the spiro[4.4]nonane system; 1,7-cyclododecadiyne and related compounds; certain substitution and reaction reactions of [2.2]paracyclophane.

419* (German.) The Metal-Organic Derivatives of Acetylene. **Über metallorganische Derivate des Acetylens. III.** Helmut Hartmann and Gerhard Nowak. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 290, July 1957, p. 348-351.

Compounds of the type $R_nMeC{\equiv}CMeR_n$, where Me=As, were studied. Their physical and chemical properties, and the methods of the preparation are described.

420* (Russian.) The Kinetics of Benzoyl Peroxide Decomposition in Carbon Tetrachloride-Isopropanol Mixtures. **Kinetika initsiirovannoi perekis'iu benzoila reaktsii izopropilovogo spirta s chetyrekhkhloristym uglerodom.** V. A. Shushunov, G. A. Razuvaev, B. N. Moryganov, and M. K. Safonova. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 6, June 1957, p. 1203-1209.

The decomposition was shown to be of the first order with respect to the peroxide for concentrations of the latter ranging from 2.33×10^{-6} to 7×10^{-3} molar.

421* (Russian.) Reaction of Ethylene and Cyclohexene Oxides With Organochlorosilanes. **O vzaimodeistvii okisi etilena i okisi tsiklogeksena s organokhlorosilanami.** M. S. Malinovskii and M. K. Romantsevich. *Zhurnal Obshchei Khimii*, v. 27, no. 7, July 1957, p. 1873-1876.

Preparation of 9-β chlorethoxyorganochlorosilanes by the condensation of ethylene oxide with certain organochlorosilanes. Reaction to cyclohexene oxide with organochlorosilanes to form 5,2-chlorocyclohexoxyorganochlorosilanes.

422* (Russian.) Organic Insecto-Fungicides. **Iz oblasti organicheskikh insektofungisidov. XXVI.** Synthesis of Mixed Esters of Dithiophosphorous Acid by a New Method. **Novyi**

metod sinteza smeshannykh efirov ditiofosfornoi kisloty. N. N. Mel'nikov, A. F. Grapov, and K. D. Shvetsova-Shilovskaia. *Zhurnal Obshchei Khimii*, v. 27, no. 7, July 1957, p. 1905-1907.

Reaction of acid esters of dithiophosphorous acid with aromatic diazo compounds. Description and properties of compounds obtained.

423* (Russian.) Halide Arylation of Unsaturated Compounds With Aromatic Diazo Compounds. **Galoidarilirovanie nepredelnykh soedinenii aromaticheskimi diazosoedineniiami. V.** Chlororylation Divinyl Synthesis of α-Arylbutadienes. **Khlorarilirovanie divinila sintez α-arilbutadienov.** A. V. Dombrovskii and A. P. Terent'ev. *Zhurnal Obshchei Khimii*, v. 27, no. 7, July 1957, p. 2000-2004.

The reaction of divinyl with several aryldiazo chlorides in the presence of cupric chloride; 13 compounds of this type were prepared.

424* (Russian.) Chlorination and Bromination of Phenyltrichlorosilane, and Combinational Dispersion Spectra of the Halogen - Substituted Phenyltrichlorosilanes. **Khlorirovanie i bromirovanie feniltrikhlorsilana i spektry kombinatsionnogo rasseianiia sveta galoidzameshchennykh feniltrikhlorsilanov.** A. D. Petrov, M. I. Batuev, V. A. Ponomarenko, A. D. Snegova, A. D. Matveeva, and B. A. Sokolov. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2057-2061.

Chlorination and bromination of phenyltrichlorosilane in the presence of powdered Fe at 70 C.

425* (Russian.) Reaction of Dialkylchlorosilanes in the Presence of Aluminum Chloride. **Reaktsiia dialkilkhlorsilanov s khloristym aliuminiem.** B. N. Dolgov, S. N. Borisov, and M. G. Voronkov. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2062-2066.

Catalyzed reduction of alkylchlorosilanes, R_nSiCl_{4-n}, into respective alkylsilanes, R_nSiH_{4-n} (where n=1-3), by means of trialkylsilanes, R_3SiH.

426* (Russian.) Synthesis of Alkylalkoxyacetoxysilanes. **Sintez alkilalkoksiatsetoksisilanov.** K. A. Andrianov, A. A. Zhdanov, and A. A. Bogdanova. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2073-2075.

Reaction of methyltriacetoxysilane with isoamyl alcohol and with monomethacrylic ether glycol; reaction of dimethyldiacetoxysilane with ethylene glycol.

427* (Russian.) Reaction of β-Chlorovinylketones With β-Dicarbonyl Compounds. **Vzaimodeistvie β-khlorvinilketonov s β-dikarbonil'nymi soedineniiami. IV.** Synthesis of Vinyl Analogs. β-Keto Acid Ether. **Sintez vinilogov efirov β-ketonokislot.** N. K. Kochetkov, L. I. Kudriashov, and R. A. Aleeva. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2166-2171.

Preparation of methyl ethers of α-(3-ketoalkenyl)-aliphatic acids by the treatment of diethyl ethers of alkyl-(3-ketoalkenyl)-malonic acid with a solution of caustic potash.

428* (Russian.) Synthesis of N-Substituted Methacrylamides. **Sintez n-zameshchennykh metakrilamidov. II.** N-Arylmethacrylamides. **N-arilmetakrilamidy.** T. A. Sokolova. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2205-2208.

Synthesis of five N-substituted methacrylamides.

429* (Russian.) Synthesis N-Substituted Methacrylamides. **Sintez N-zameshchennykh metakrilamidov. III.** N-Alkylacryl- and Alkylmethacrylamides. **N-alkilakril- i alkilmetakrilamidy.** M. M. Koton, T. A. Sokolova, M. N. Savitskaia, and T. M. Kiseleva. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2239-2242.

Synthesis of N-alkylacrylamides (methyl-, ethyl-, dimethyl-, and diethyl-) and N-alkylmethacrylamides (methyl-, ethyl-, dimethyl-, diethyl- and piperidyl-) by chloranhydride acylation of acrylic and methacrylic acids in benzene. Chloranhydride acylation of methacrylic acid in aqueous medium produces N-butyl- and N-actyl methacrylamides.

430* (Russian.) Chemistry of Selenophene. **Khimiia selenofena. VII.** Synthesis and Acetylation of Arylselenophenes and 2,3-Benzoselenophene. **Sintez i atsetilirovanie 3-arilselenofenov and 2,3-benzoselenofena.** Iu. K. Iur'ev, N. N. Mezentsova, T. A. Melent'eva, and E. G. Treshchova. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2260-2267.

Synthesis of 3-phenylselenophene, 3-*n*-tolylselenophene, and 2,3-benzoselenophene by the reaction of 2-phenylbutene-2, 2-*n*-tolylbutene-2, and styrene, respectively, with selenium dioxide in the presence of chromium oxide on aluminum oxide at 450 C. Acylation of 3-arylselenophenes and 2,3-benzoselenophene with silicoacetic anhydride.

See also: **79** (stability of tocopherol); **143** (preparation of 4-amino-1-butanols); **222** (metal terephthalamates); **781** (irradiation of fatty acid esters); **1477** (cinnamyl alcohol in lignin).

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431 The Photolysis of Dimethyl Ketene Vapor. Richard A. Holroyd and Francis E. Blacet. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4830-4834.

At 2537 Å. the quantum yield of CO was unity, within experimental error, under all conditions.

432 Photoreduction of Methylene Blue by Ethylenediaminetetraacetic Acid. Gerald Oster and Neil Wotherspoon. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4836-4839.

433 Studies of the Tritium Labeling Reaction. III. Alcohols and Acetone. Wilford J. Hoff, Jr. and F. S. Rowland. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4867-4872.

All of the important non-gaseous products can be formed in a reaction involving the tritium atom and a single solvent molecule.

434 Theory of Solutions. I. Terrell L. Hill. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4885-4890.

A formal theory, based on suitable partition functions, which yields directly thermodynamic functions expressed in a particularly practical form.

435 Chemical Evidence for Oxide Films on Platinum Electrometric Electrodes. Fred C. Anson and James J. Lingane. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4901-4904.

The oxide films present on anodes inhibit oxidation of other substances at the electrode.

436 Solutions of Metals in Amine Solvents. I. The Conductance of Concentrated Solutions of Lithium in Methylamine. E. Charles Evers, Archie E. Young, II, and Armand J. Panson. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5118-5120.

At saturation the equivalent conductance is 5333; with decreasing concentration the conductance decreases exponentially, goes through a minimum of 48 at 0.1 *N* and increases with further dilution.

437 α-Hydrogen Bonding—A Theory of the Baker-Nathan Effect. Maurice M. Kreevoy and Henry Eyring. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5121-5125.

The interactions between 1,3-atoms in complex molecules were examined, particularly for the case in which one of the atoms is H. The added stabilization which results from such interactions is approximately proportional to the number of H atoms in a 1,3-relationship with a π-orbital. The name "α-hydrogen bonding" is suggested for this added stabilization and calculations suggest that it is large enough to account for a substantial fraction of the Baker-Nathan effect.

438 Irradiation of Petroleum Hydrocarbons. I. Electron Bombardment of Liquid Butanes. V. J. Keenan, R. M. Lincoln, R. L. Rogers, and H. Burwasser. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5125-5128.

The irradiation of liquid *n*-butane by one million volt electrons yields principally mixtures of octenes and octanes. Smaller amounts of hydrogen, ethane, butene, and higher products such as C_{12}, C_{16}, and C_{20} hydrocarbons are also encountered. Isobutane yields in addition to such products, methane, propylene, and large amounts of C_7 hydrocarbons which are attributed to the formation of C_3 fragments and their subsequent participation in addition or combination reactions.

439 X-Ray Diffraction of Molecular Compounds of Long-Chain Saturated Fatty Acids. II. Some Further Observations on the Diffraction of Molecular Compounds of Acetamide and Long-Chain Saturated Fatty Acids. Robert T. O'Connor, Robert R. Mod, Mildred D. Murray, Frank C. Magne, and Evald L. Skau. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5129-5132.

440 The Crystallography and Structure of Some C_{19} Cyclopropane Fatty Acids. T. Brotherton and G. A. Jeffrey. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5132-5137.

Unit cell dimensions and space groups were determined for four synthetic fatty acids, *cis*- and *trans*-DL-9, 10-methyleneoctadecanoic and *cis*- and *trans*-DL-11, 12-methylene-octadecanoic, and two natural products, lactobacillic acid and dihydrosterculic acid.

441 The Exchange Between Hydrocarbons and Deuterium on Palladium Catalysts. Robert L. Burwell, Jr., Benjamin K. C. Shim, and H. C. Rowlinson. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5142-5148.

Results of isotopic exchange between deuterium and twelve alkanes and cycloalkanes.

442 Nuclear Magnetic Resonance Studies of the Aluminum Fluoride Complexes. Robert E. Connick and Richard E. Poulson. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5153-5157.

The nuclear magnetic resonances of F^{19} and Al^{27} were studied in solutions containing NaF and $Al(NO_3)_3$.

443 Mechanisms of Exchange Reactions Between Acyl Halides and Molecular Halogens. Alex Goldman and Richard M. Noyes. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5370-5375.

444 Mechanism of Substitution Reactions of Complex Ions. XIII. Reactions of Some *trans*-$Co(AA)_2Cl_2^+$ in Methanol. XIV. Reactions of *cis*-$Co(en)_2Cl_2^+$ With Basic Anions in Methanol. Ralph G. Pearson, Patrick M. Henry, and Fred Basolo. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5379-5385.

445 The Mechanism of Chemisorption: Hydrogen on Nickel. II. Edward L. Lee, Jean A. Sabatka, and P. W. Selwood. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5391-5397.

Effect of changing experimental conditions; determination of the differential heats of chemisorption; the slow take up of hydrogen which may be observed following the rapid chemisorption; a study of the "hydride" effect, or apparent reversal of electron transfer which may be observed at very low temperatures.

446 Liquid Scintillators. V. Absorption and Fluorescence Spectra of 2,5-Diaryloxazoles and Related Compounds. Donald G. Ott, F. Newton Hayes, Elizabeth Hansbury, and Vernon N. Kerr. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5448-5454.

Ultra-violet absorption data and wave lengths of maximum emission and mean wave lengths of fluorescence. Synthesis and evaluation as scintillator solutes of previously unreported compounds.

447 The Effect of Builders on the Sorption of Sodium Myristyl Sulphate on Cotton and on Carbon. G. S. Perry, A. S. Weatherburn, and C. H. Bayley. *American Oil Chemists' Society, Journal*, v. 34, Oct. 1957, p. 493-495.

448 Reaction Kinetics in Differential Thermal Analysis. Homer E. Kissinger. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1702-1706.

Differential thermal analysis can be used to obtain information about kinetics and reaction order of simple decomposition reactions of type solid → solid + gas. Order of reaction can be found from shape of differential thermal analysis peak. Results of differential thermal experiments with magnesite, calcite, and brucite are given.

449 Vapor Absorption Spectra and Oscillator Strengths of Naphthalene, Anthracene, and Pyrene. J. Ferguson, L. W. Reeves, and W. G. Schneider. *Canadian Journal of Chemistry*, v. 35, Oct. 1957, p. 1117-1123.

450 Heats of Activation in Electrode Processes. The Electrochemical Desorption Mechanism of the Discharge of Hydroxonium Ions. B. E. Conway and J. O'M. Bockris. *Canadian Journal of Chemistry*, v. 35, Oct. 1957, p. 1124-1136.

451 The Vibrational Spectra of Pyridine, Pyridine-4-d, Pyridine-2,6,-d_2, and Pyridine-3,5-d_2. J. K. Wilmshurst and H. J. Bernstein. *Canadian Journal of Chemistry*, v. 35, Oct. 1957, p. 1183-1194.

452 Infrared Spectrum of the H_3O^+ Ion in Aqueous Solutions. Michael Falk and Paul A. Giguère. *Canadian Journal of Chemistry*, v. 35, Oct. 1957, p. 1195-1204.

Absorption spectra at 25 C of aqueous solutions of mineral acids (HCl, HBr, HNO_3, $HClO_4$, H_2SO_4, H_3PO_4) and of some of their acid salts in various concentrations were measured from 2 to 25μ. The existence of discrete hydronium ions in the liquid state, with average life longer than 10^{-13} sec. is confirmed.

453 The Gas Phase Reaction of Methyl Radicals With Hexafluoroacetone. G. O. Pritchard and E. W. R. Steacie. *Canadian Journal of Chemistry*, v. 35, Oct. 1957, p. 1216-1224.

The photolytic and thermal decomposition of azomethane in the presence of hexafluoroacetone produces small amounts of fluorinated products, mainly fluoroform. The proposed reaction $CH_3 + CF_3COCF_3 \rightarrow CH_3COCF_3 + CF_3$ has an activation energy of about 6 kcal. per mole with a steric factor of about 10^{-5}.

454 Polarography of Uranium. III. Uranium (VI) in Fluoride Media. David J. McEwen and Thomas De Vries. *Canadian Journal of Chemistry*, v. 35, Oct. 1957, p. 1225-1236.

455 Calculation of Liquid-Vapor Equilibrium Constants From Solubility Data. Leo Friend and S. B. Adler. *Chemical Engineering Progress*, v. 53, Sept. 1957, p. 452-458.

Shows how the various types of solubility data found in the literature can be converted into liquid-vapor equilibrium constants, and how such information can be extended to other temperatures, pressures, and compositions for the general case as well as where Henry's law applies.

456 The Rotatory Dispersion of L(+)-α-Alanine. M. K. Hargreaves and P. J. Richardson. *Chemical Society, Journal*, 1957, Sept., p. 3823-3828.

Effects of temperature and solvent were studied.

457 Studies in the Synthesis of Cortisone. XX. The Infrared Absorption of α-Halogeno-oxo-Steroids. E. G. Cummins and J. E. Page. *Chemical Society, Journal*, 1957, Sept., p. 3847-3858.

Infra-red absorption between 4000 and 400 $cm.^{-1}$ of cyclohexanones, oxosteroids, oxo-steroidal sapogenins, α-halogeno-oxo-steroids, α-bromo-oxo-triterpenoids, and related substances; effect of α-halogen substituents on the carbonyl frequency of oxosteroids and triterpenoids.

458 Characteristic Infrared Absorption Frequencies in the *cis-trans* Isomers of Dimeric Nitroso-Alkanes. B. G. Gowenlock, H. Spedding, J. Trotman, and D. H. Whiffen. *Chemical Society, Journal*, 1957, Sept., p. 3927-3930.

459 Adsorption From Binary Liquid Mixtures on Silica and Titania Gels. J. J. Kipling and D. B. Peakall. *Chemical Society, Journal*, 1957, Sept., p. 4054-4058.

Data for physical adsorption at 20 C from binary liquid mixtures on silica and titania gels were analyzed to give individual adsorption isotherms. For systems containing an alcohol, allowance is made for the slow chemisorption which takes place, and individual isotherms for the residual physical adsorption are then calculated.

460* (Russian.) The Absorption Spectra of Some Tetravalent Uranium Compounds at Liquid Nitrogen Temperature. **Spektry pogloshcheniia nekotorykh soedinenii chetyrekhvalentnogo urana pri temperaturakh zhidkogo azota.** V. T. Aleksanian. *Doklady Akademii Nauk, SSSR*, v. 115, no. 2, July 11, 1957, p. 333-335 + 1 plate.

Studies of the following compounds: $U(SO_4)_2 \cdot 8H_2O$; $U(C_2O_4) \cdot 6H_2O$; $K_4U(C_2O_4) \cdot 5H_2O$; $K_2Sr\ U(CO_2O_4)_4 \cdot 8H_2O$; $Ca_2\ U(C_2O_4)_4 \cdot 6H_2O$; $Ba_4\ U(C_2O_4)_4 \cdot 8H_2O$; and $Na_4\ U(P_2O_7)_2 \cdot 8H_2O$.

461* (Russian.) The Heat and Free Energy of Formation of Zirconium Nitrides as Related to Composition and Structure. **Zavisimost' teplot i svobodnykh energii obrazovaniia nitridov tsirkoniia ot sostava i stroeniia.** E. I. Smagina, V. S. Kutsev, and B. F. Ormont. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 354-357.

It was found that zirconium nitride is a phase of a variable composition with a wide homogeneity region. Compounds were prepared in the range from $ZrN_{1.0}O_{0.04}$ to $Zr\ N_{0.86}O_{0.02}$; the heats and free energies of formation varied from 90.7 to 57.5 kcal. per mole and 81.1 to 52.3 kcal. per mole respectively.

462* The Use of Anomalous Scattering for the Determination of Crystal Structures—$KMnO_4$. S. Ramaseshan, K. Venkatesan, and N. V. Mani. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Aug. 1957, p. 95-111.

The decrease in the scattering factor when the incident radiation is close to the absorption edge of an atom was utilized for determining the structure of the centrosymmetric crystal $KMnO_4$.

463* Influence of Chemisorbed Carbon Monoxide on Subsequent Physical Adsorption of Nitrogen. V. Srinivasan. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Aug. 1957, p. 120-133.

Suppression of N adsorption on Co powder appears to be due to the presence of certain active centers on the surface of the Co which chemisorb CO in such a manner that subsequent adsorption of N does not take place.

464 Pressure-Temperature-Liquid Density Relations of Pure Hydrocarbons. Critical Temperatures of Pure Hydrocarbons. Alfred W. Francis. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1779-1788.

Data on pressure-volume-temperature relations of 44 pure hydrocarbons. Difference between observed critical temperature and boiling point is tabulated for 56 hydrocarbons.

465* (Dutch.) The Phenomenon of Prototropy. **Het verschijnsel van de prototropie.** Marc Anteunis. *Industrie Chimique Belge*, v. 22, Aug. 1957, p. 927-954.

Mobility of an H atom in the α position of an ethylenic bond; the resulting interconversion of isomers. Mechanisms of isomerization. Equilibria data. Importance of prototropy in organic preparative chemistry.

466* (Russian.) The Shape of Liquidus Curves of Binary Systems. **O forme krivykh likvidusa dvoinykh sistem. I.** Eutectic-Type Systems With Nondissociating Components. **Sistemy evtekticheskogo tipa s nedissotsiiruiushchimi komponentami.** Iu. M. Kessler. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 8, Aug., p. 887-897.

Mathematical analysis.

467* (Russian.) The Mechanism of Catalytic Effect of Semiconductors. **O mekhanizme kataliticheskogo deistviia poluprovodnikov.** F. F. Fol'kenshtein. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 8, Aug., p. 924-928.

Adsorption of saturated molecules on the surface of semiconductors.

468 Chemical Etches and Etch Pit Patterns on PbS Crystals. R. F. Brebrick and W. W. Scanlon. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 607-608.

Chemical etches have been found which polish or remove thick surface layers from PbS crystals. The dissolving action of this etch on PbS, PbSe, and PbTe and the etch pit patterns formed by it on natural and synthetic PbS crystals are discussed.

469 Study of the Mass Spectra of the Lower Aliphatic Alcohols. L. Friedman, F. A. Long, and M. Wolfsberg. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 613-622.

Mass spectra and appearance potentials were determined for methanol, ethanol, and propanol. These data are used in semiempirical application of the statistical theory of mass spectra. The theory facilitates assignment of plausible mechanisms for the production of the various ion fragments.

470 Dielectric Properties of Polyethylene Glycols at Microwave Frequencies. Naokazu Koizumi. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 625-630.

The complex dielectric constants of ethylene, diethylene, triethylene, tetraethylene, and hexaethylene glycols in the liquid state were measured at frequencies of 1.43, 9.73, and 18.7 kmc. pr sec. at temperatures from 5 to 50 C.

471 Application of Nuclear Magnetic Resonance to the Study of Acid-Base Equilibria. Ernest Grunwald, A. Loewenstein, and S. Meiboom. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 641-642.

Studies in methylamine, dimethylamine, and trimethylamine showed that the chemical shift of the methyl protons is a linear function of the concentration ratio of acid to base plus acid.

472 Thermodynamic Properties of the Gaseous Alkali Halides. Stuart A. Rice and William Klemperer. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 643-645.

473 Adsorption of Nickel on Molybdenum in the Field Emission Microscope. E. C. McIrvine and R. C. Bradley. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 646-652.

Nickel was found to adsorb coherently on Mo, preferentially on the (111) planes of the substrate. The equilibrium position of heavy layers was found to be field dependent.

474 Infrared and Raman Spectra of Phosphorus Pentachloride. J. K. Wilmshurst and H. J. Bernstein. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 661-664.

475 Exchange of Ammonia Between Metal-Ammine Cations and Solvent in Liquid Ammonia. Hans U. D. Wiesendanger, Walter H. Jones, and Clifford S. Garner. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 668-672.

476 Infrared Spectrum and Force Constants of the Nitrite Ion. Ralph E. Weston, Jr. and Thomas F. Brodasky. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 683-689.

477 Reactions of Alkoxy Radicals. I. Photolysis of Methyl Acetate. M. H. J. Wijnen. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 710-715.

Photolysis was studied in the vapor phase over the temperature range 29 to 217 C in varying light intensities and initial pressures. The main primary step is a split of the ester molecule into CH_2CO and CH_3O radicals.

478 Monte Carlo Equation of State of Molecules Interacting With the Lennard-Jones Potential. I. A Supercritical Isotherm at About Twice the Critical Temperature. W. W. Wood and F. R. Parker. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 720-733.

Values are calculated for compressibility factor, excess internal energy, excess constant-volume heat capacity, and radial distribution function of Lennard-Jones (12,6) molecules.

479 Vibrational Spectra of Fluorinated Aromatics. XIII. Benzotrifluoride. N. A. Narasimham, J. Rud Nielsen, and Rose Theimer. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 740-745.

480 Electronic Band Structure of Boron Carbide. Masatoshi Yamazaki. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 746-751.

481* (French.) Isotope Exchange and Transformation of Metal Surfaces in Electrolytic Solutions. **Échange isotopique et évolution des surfaces métalliques dans des solutions électrolytiques.** U. Camerini, J. Danon, and M. Malagolowkin. *Journal de Chimie Physique*, v. 54, July-Aug. 1957, p. 527-532.

Autoradiography of deposits of metal containing ThC. Penetration into the metals of a fraction of the radioactive atoms was revealed. The penetration is attributed to changes in the surface during the process of ion exchange.

482* (French.) A Study of the Cupric Complexes of α-Phenyl-Pyridine-Methanol-2. **Étude des complexes cuivriques de l'α-phenyl-pyridine-methanol-2. I.** Ionization Constants of α-Phenyl-Pyridine-Methanol-2. Stability Constants of the Cupric Complexes. **Constantes d'ionisation de l'α-phénylpryidine-méthanol-2. Constantes de stabilité des complexes cuivriques. II.** Stability Constants. The "Formation Function" Method. Insoluble Complexes. **Constantes de stabilité. Méthode de la "fonction de formation". Complexes insolubles.** Jean-Charles Pariaud and Claude Tissier. *Journal de Chimie Physique*, v. 54, July-Aug. 1957, p. 533-552.

483* (French.) A New Method for the Study of Reactions in Solution, the Potentiometric Surface Method. **Nouvelle méthode d'étude des réactions en solution: méthode de la surface potentiométrique. II.** Application to the Study of Two-Component-Systems, Borates, Vanadates, Magnesium Oxalate. **Application à l'étude de systèmes à deux composants: borates, vanadates, oxalate de magnesium. III.** Application to the Study of Malic and Citric Copper Compounds. **Application à l'étude des composés maliques et citriques du cuivre. IV.** Application to the Study of Tartaric and Glycolic Copper Compounds. **Application à l'étude des composés tartriques et glycoliques du cuivre.** Jean Lefebvre. *Journal de Chimie Physique*, v. 54, July-Aug. 1957, p. 553-619.

484 Inhibition of Foaming. VIII. Changes in Electrical Conductivity of Colloidal Electrolyte Solutions on Addition of Non-Ionic Foam Stabilizers and Foam Inhibitors. Sydney Ross and T. H. Bramfitt. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1261-1265.

485 A New Theory of Foam Formation and Its Experimental Verification. Masayuki Nakagaki. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1266-1270.

A thermodynamic theory of foam formation and of foam stability is developed using foam volume and foam life as criteria. According to the theory, foaminess and foam stability in dilute solutions of relatively low viscosity increase with the energy required to transfer the excess solute from the surface into the body of the solution. The systems studied are aqueous alcohol, electrolyte, dye-stuff, and gelatin solutions.

486 Energy Relations in Unimolecular Film Formation. The Spreading of Cetyl Alcohol and Palmitic Acid on Aqueous Surfaces. G. E. Boyd and J. Schubert. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1271-1275.

The temperature variations of the spreading pressures, π_e of cetyl alcohol and palmitic acid on clean aqueous surfaces were measured, and the molar heats, entropy, free energy, and enthalpy changes accompanying monolayer formation were estimated.

487 Surface Conductance of Various Ion Forms of Bentonite in Water and the Electrical Double Layer. H. van Olphen. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1276-1280.

488 The Electrokinetic Behavior of Inorganic Substances in the Presence of Surface Active Agents. Harold O. Strange and J. Fred Hazel. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1281-1283.

The electrokinetic behavior of several positive and negative inorganic colloidal systems was studied in the presence of anionic and cationic surface active agents, by electrophoretic and streaming potential methods.

489 The Standard Free Energy Change for the Formation of the Sodium Lauryl Sulfate Micelle. Horst W. Hoyer. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1283-1285.

Equilibrium concentrations of sodium ions, lauryl sulfate ions, and micelles are calculated for solutions of sodium lauryl sulfate from light scattering, electrophoresis, and conductivity data.

490 A Study of the Colloidal Characteristics of Petroleum Using the Ultracentrifuge. B. Roger Ray, Paul A. Witherspoon, and Ralph E. Grim. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1296-1302.

The presence of discrete colloidal particles in three crude oils from the Illinois basin were positively established by sedimentation studies. Centrifugation at 80,000 g. at room temperature and for periods up to 12 days demonstrated that different groups of colloidal materials are dispersed in the oils.

491 A Six Flux Solution of Multiple Scattering by Dispersion With a Partially Reflecting Boundary. Chiao-Min Chu, George C. Clark, and Stuart W. Churchill. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1303-1309.

The scattering of electromagnetic radiation by dense dispersions having a partially reflecting boundary was investigated theoretically. Finite, parallel-plane dispersions of non-absorbing, uniformly sized particles were considered. A six-flux representation was used to reduce the transport equation to a set of ordinary differential equations. An analytical solution was found for these equations and the appropriate boundary conditions for reflection.

492 Adsorption From Solution of Stearic Acid on Iron; Effect on Electrode Potential. John J. Bordeaux and Norman Hackerman. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1323-1327.

Adsorption isotherms for both total and irreversible sorption were obtained at room temperature for the system: metallic Fe in 80% ethanol-H_2O solutions of stearic acid. The isotherms were determined using C^{14}-tagged stearic acid. The effect of non-radioactive stearic acid on the steady-state potential of Fe was determined.

493 The Nature of Silica-Alumina Catalysts. Thomas J. Gray. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1341-1343.

Differential thermal analysis and X-ray studies were employed in a detailed investigation of extremely high-purity silica-alumina specimens of varying compositions to elucidate the nature of their catalytic activity. The disappearance of a unique alumina phase simultaneously with the disappearance of catalytic activity led to the suggestion that the catalytically active species is a half-inverted spinel with protons in certain octahedral sites.

494 A Theoretical Analysis of Ion Binding. Frederick T. Wall. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1344-1347.

The binding of counter ions to polymeric ions is considered in light of the numerical solutions available for the Poisson-Boltzmann equation applied to spherical polyelectrolytes. The ion association can be specified by two parameters, a relative polymer charge density and a reduced polyion radius.

495 Counterion Binding by Polyelectrolytes. I. Exploratory Electrophoresis, Solubility and Viscosity Studies of the Interaction Between Polyphosphates and Several Univalent Cations. Ulrich P. Strauss, Daniel Woodside, and Philip Wineman. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1353-1356.

The nature of the binding of Li, Na, K, and tetramethylammonium ions by polyphosphates, ranging in degree of polymerization from 160 to 27,000 was explored by electrophoresis, salting-out, and viscosity studies.

496* A Thermochemical Study of the Reaction of Calcium Hydroxide, Silica Gel, and Water. Edwin S. Newman. *Journal of Research, National Bureau of Standards*, v. 59, Sept. 1957, p. 187-196.

Heats of reaction were measured by a heat-of-solution method. The reaction was carried out at 25 C in pastes having a water-solid ratio of about 1.0.

497* Dissociation of 4-Chloro-4'-Aminodiphenylsulfone. Elizabeth E. Sager and Fleur C. Byers. *Journal of Research, National Bureau of Standards*, v. 59, Oct. 1957, p. 245-248.

498* Standards for pH Measurements From 60° to 95° C. Vincent E. Bower and Roger G. Bates. *Journal of Research, National Bureau of Standards*, v. 59, Oct. 1957, p. 261-264.

Electromotive force measurements of cells with H and Ag-AgCl electrodes and containing buffer-chloride solutions.

499* (English.) **The Fine Structure and Properties of Fibrous Alumina.** John H. L. Watson, Aristides Vallejo-Freire, Persio de Souza Santos, and Jonathan Parsons. *Kolloid-Zeitschrift*, v. 154, Sept. 1957, p. 4-15.

Structure and composition was studied by solubility in acids, birefringence, water content, aging in water, X-ray and electron diffraction, and electron microscopy. It consists mainly of amorphous $Al(OH)_3$ and contains some adsorbed water and Al oxide.

500* (English.) **Relation Between Time of Gelation and Concentration of Silicic Acid, Iron and Chromium Silicates.** Kanhaiya Lal Yadava and S. Ghosh. *Kolloid-Zeitschrift*, v. 154, Sept. 1957, p. 51-52.

Time of set obeys the equation $1/t = Ae^{BC}$, where A and B are constants for a particular pH and C is the concentration of silica.

501* (German.) Electrical Conductivity of Ag_2F and the Effect of Temperature. **Elektrische Leitfähigkeit von Ag_2F und ihre Temperaturabhängigkeit.** R. Hilsch, G. V. Min-

nigerode, and H. V. Wartenberg. *Naturwissenschaften*, v. 44, no. 17, Sept. 1957, p. 463-464.

Production and properties of large crystals of Ag_2F produced by electrolysis of AgF solution.

502 Mode of Action of Fluorescent Whitening Agents and Measurement of Their Relative Efficieney. Eugene Allen. *Optical Society of America, Journal*, v. 47, Oct. 1957, p. 933-943.

Fluorescent whitening agents improve appearances through two visual effects, a bluing effect and a lightening effect.

503 The Phase Rule and Heterogeneous Equilibrium. John E. Ricci. 505 p. 1951. D. Van Nostrand Co., New York. (QD501 R35p)

A systematic study of the meaning and application of the phase rule, with emphasis on the interconnection between the familiar phase diagrams of systems of various numbers of components.

504 (English.) **Structure and Zeeman Effect in the Spectrum of the Iridium Atom, Ir I.** TH. A. M. Van Kleef. *Physica*, v. 23, no. 9, Sept. 1957, p. 843-897.

Analysis of existing wavelength data of the Ir I spectrum resulted in the detection of 1 even ground level and 20 odd levels in addition to those previously reported. Moreover a group of 12 high even levels has been discovered. The total number of classified lines is now 2110, corresponding to 2192 transitions between 30 even ground levels, 164 odd levels and 41 high even levels.

505 Production of Colloidal Sodium in NaCl by Ionizing Radiation. W. Dale Compton. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1271-1275.

Coloration of crystals with Co^{60} γ-ray and 1.3 m.e.v. electron irradiation.

506 Drift Velocities of Ions in Nitrogen at Various Temperatures. F. R. Kovar, E. C. Beaty, and R. N. Varney. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1490-1492.

Drift velocities of N ions in N gas as a function of field over pressure were studied by a pulsed Townsend discharge method at temperatures of 77, 300, and 450 K.

507* Thermal Transformations in Solids. A. R. Ubbelohde. *Quarterly Reviews*, v. 11, no. 3, 1957, p. 246-272 + 2 plates.

Inadequacy of classical phase relations for describing transitions between condensed phases. Crystal structure and thermodynamics of transformations in solids. Structural origin of entropy increases. Structural techniques for studying changes accompanying transformations.

508 Effects of Ionizing Radiations on Solids. II. Some Chemical Effects. M. Daniels and J. Weiss. *Research*, v. 10, Oct. 1957, p. 396-401.

Effect of radiation on ionic crystals including alkalies, nitrates, and cyanides; inorganic molecular crystals; and organic molecular solids.

509* Adsorption in Swelling Versus Nonswelling Systems. I. Contact Area. II. Free Energy Change per Unit Area of Effective Molecular Contact. Alfred J. Stamm. *Tappi*, v. 40, Sept. 1957, p. 761-770.

510 The Hydrogen Fluoride Polymer Spectrum, Hexamer and Tetramer. D. F. Smith. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, K-1336, Sept. 1957, 44 p. (UF767 Un3.1k Contin.)

Experimental techniques employed to investigate the polymer absorption. Results at various pressures at temperatures from −70 to +73 C.

511 Tri-Dimensional Examination of Chemical Systems in Gel Media. L. H. Gevantman, R. C. Chandler, and J. F. Pestaner. *U. S. Naval Radiological Defense Laboratory, Research and Development Technical Report*, USNRDL-TR-163, May 1957, 34 p. (QC475 Un3.5r Contin.)

Technique for the colorimetric measurement of tri-dimensional reaction product distributions in firm aqueous gels. The two chemical systems employed contain agar in combination with low concentrations of either KI-starch or trichloroethylene-bromcresol purple.

512* (German.) The Raman Spectra of Certain Silico-Sulfur Compounds. **Raman-Spektren einiger Silicium-Schwefelverbindungen.** J. Goubeau and W. D. Hiersemann. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 290, July 1957, p. 292-301.

Studies of the Raman spectra of $(CH_3)_3SiSH$, Cl_3SiSH, $(CH_3)_3SiSSi(CH_3)_3$, $Cl_3SiSSSiCl_3$, $(CH_3)_2SiS_2Si(CH_3)_2$, and $Cl_2SiS_2SiCl_2$.

513* (German.) Liquid Crystals and Molecular Structure. **Flüssige Kristalle und Molekelbau. VI.** Effect of Constitution of Fluid Crystalline Compositions on the Melting and Settling Points. **Konstitutionseinfluss auf Schmelzpunkt und Klärpunkt kristallin-flüssiger Verbindungen.** Christian Wiegand. *Zeitschrift für Naturforschung*, v. 12b, Aug.-Sept. 1957, p. 512-513.

514* (English.) **Reaction of Malonic and Monoalkyl Malonic Acids With Iodine.** V. M. Bhale, S. L. Bafna, and W. V. Bhagwat. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 12, nos. 5-6, Sept. 1957, p. 298-302.

Evaluation of kinetic rate constants using a conductometric method.

515* (German.) The Hydrolysis of Tetranitromethane in an Aqueous Solution by Means of Co^{60} Gamma Rays. **Die Hydrolyse des Tetranitromethans in wässriger Lösung durch ^{60}Co-Gamma-Strahlen.** Arnim Henglein and Jürgen Jaspert. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 12, nos. 5-6, Sept. 1957, p. 324-334.

Gamma rays acting on aqueous solutions of tetranitromethane caused the formation of nitroform with a G-value of 3.73. Later a methazonic acid was formed.

516* (German.) The Vibration Spectrum and Structure of Tetramethyldithio - Diphosphine. **Das Schwingungsspektrum und die Struktur des Tetramethyldithio-diphosphins.** J. Goubeau, H. Reinhardt, and D. Bianchi. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 12, nos. 5-6, Sept. 1957, p. 387-392.

Infra-red and Raman spectra were examined and symmetry relationships were established for the transform. The results confirm data from chemical investigations. The chemical stability against oxidation and hydrolysis indicates the presence of four bonds on each of the phosphorus atoms.

517* (Russian.) The Infra-Red Absorption Spectra of Trialkylalkoxysilanes. **Infrakrasnye spektry pogloshcheniia trialkilalkoksisilanov.** M. O. Bulanin, B. N. Dolgov, T. A. Speranskaia, and N. P. Kharitonov. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 6, June 1957, p. 1321-1327.

518* (Russian.) "Model" Systems: Na_2BeF_4-Li_2BeF_4 and Ca_2SiO_4 - $MgSiO_4$. **"Model'nye" sistemy: Na_2BeF_4 - Li_2BeF_4 and Ca_2SiO_4-Mg_2SiO_4.** N. A. Toropov and I. L. Shchetnikova. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 8, Aug. 1957, p. 1855-1863 + 1 plate.

By thermal and radiographic analysis two compounds were detected, $NaLiBeF_4$ and $Na_3Li(BeF_4)_2$. The melting point of the first is 350 C, the other 340 C.

519* (Russian.) The Sublimation of Germanium Monosulfide. **O sublimatsii monosul'fida germaniia.** V. I. Davydov and H. P. Diev. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 9, Sept. 1957, p. 2003-2006.

The pressure of GeS vapor in the temperature range 300 to 635 C changes from 10^{-4} to 2 mm. Hg. The transformation of GeS occurs at 500 C.

520* (Russian.) The Solubility of Ferric Chloride and Its Mixtures With Niobium, Aluminum, and Sodium Chlorides in Titanium Tetrachloride. **Rastvorimost' khlornogo zheleza i ego splavov s khloridami niobiia, aliuminiia i natriia v chetyrekhkhloristom titane.** I. S. Morozov and D. Ia. Toptygin. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 9, Sept. 1957, p. 2129-2135.

Study of the systems $TiCl_4$-$FeCl_3$; $TiCl_4$-$FeCl_3$-$AlCl_3$; $TiCl_4$-$FeCl_3$-$NbCl_5$; $FeCl_3$-NaCl; and $TiCl_4$-$FeCl_3$-NaCl.

521* (Russian.) Catalysis of Vapor-Phase Hydrolysis of Halogen Derivatives of Organic Compounds. **Kataliz parofaznogo gidroliza galoidoproizvodnykh organicheskikh soedinenii. II.** Reversibility of the Reaction of Vapor-Phase

Hydrolysis of Chlorobenzene. **Obratimost' reaktsii parofaznogo gidroliza khlorbenzola.** A. I. Naumov and E. I. Geidel'berg. *Zhurnal Obshchei Khimii,* v. 27, no. 8, Aug. 1957, p. 2036-2039.

Reaction of phenol with HCl in the presence of phosphate catalyst in the vapor phase. Experimental determination of the equilibrium constant of the etherification reaction.

522* (Russian.) X-Ray Analysis of Organic Compounds. **Rentgenostrukturnye issledovaniia elementoorganicheskikh soedinenii. I.** Stereochemistry of Ferrocene and Its Derivatives. **Stereokhimiia ferrotsena i ego proizvodnykh.** Iu. T. Struchkov. *Zhurnal Obshchei Khimii,* v. 27, no. 8, Aug. 1957, p. 2039-2049.

See also: **260** (densities and refractive indices of glycol-water solutions); **1195** (preparation of Raney Fe); **1460** (gas separation).

COATINGS

523 A Two-Stage Model for the Solid-Phase Bonding Process. James B. Melehan, Frank C. Holden, Horace R. Ogden, and Robert I. Jaffee. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1211, July 1957, 26 p. (UF 767 U3b Contin.)

The solid-state bonding of simulated single-asperity contacts was studied, using a Au needle point in contact with a plane Au surface. The bond strength-time relation at any temperature can be expressed as the sum of three components, of which the first is time independent and corresponds to instantaneous adhesion. The time dependence of the other two terms is expressed as growth of the bonded area by creep and self-diffusion processes.

524 Polyethylene Bonded With New Process. *Bell Laboratories Record,* v. 35, Oct. 1957, p. 411.

Polyethylene can be joined directly to brass and brass plated metals, and to natural and some synthetic rubbers, producing bonds with tensile strengths up to 1000 psi. and peel strengths as much as 100 psi.

525 These Aluminum Enamels Resist Corrosion by Boiling Alkaline Water. B. W. King, W. H. Duckworth, John Schultz, and H. P. Tripp. *Ceramic Industry,* v. 69, Oct. 1957, p. 82-84.

Enamels for 25 Al were developed which exhibited corrosion rates of about 1/75 that of bare Al when exposed to boiling alkaline water for 100 hrs. These enamels were based on the Na_2O-PbO-SiO_2 eutectic composition with substitutions of a total of 10 to 15 wt.% of TiO_2, ZrO_2, and alkaline earth oxides for PbO and Na_2O. About 1 wt.% NiO was beneficial for promoting adherence.

526 Epoxy - Fiberglass Armoring for Corrosion - Erosion Protection. W. F. Oxford, Jr. *Corrosion,* v. 13, Oct. 1957, p. 615t.

527* (French.) Synthetic Elastomers in Corrosion Prevention. **Certains élastomères de synthèse dans la lutte contre la corrosion.** E. S. Voutetakis. *Corrosion et Anticorrosion,* v. 5, Sept. 1957, p. 244-252.

Elasticity, wear resistance, and chemical resistance of elastomer-based coatings after vulcanization. The use of Neoprene-based paints and of chlorosulfonated polyethylene (Hypalon).

528 Spray Painting With Compressed Air Atomisation. A. A. B. Harvey. *Electroplating and Metal Finishing,* v. 10, Oct. 1957, p. 309-314.

Automatic spraying of complex shapes; hot spraying; heating the atomizing air; advantages of hot spray application; flock spraying.

529* (German.) Spray Galvanizing as a Means of Rust Protection on Iron Poles. **Die Spritzverzinkung als Korrosionsschutz bei Eisenmasten.** Ernst Zamzow. *ETZ, Elektrotechnische Zeitschrift,* v. 9, Ausgabe B, Sept. 1957, p. 359-361.

After sandblast cleaning of Fe parts, a 0.1-mm.-thick Zn layer is sprayed on. Any weak spots that may develop during the following few weeks are treated with Zn paste. Then the poles are painted twice with a paint which should be free of Pb and acid.

530* Flame-Sprayed Zinc Layers. E. Gebhert and H. D. Seghezzi. *Industrial Finishing (London),* v. 9, Sept. 1957, p. 804 + 2 pages. (Translated from *Schweizer-Archiv,* 1955, May 21, p. 162-165.)

Investigates the mechanical properties of flame-sprayed Zn coatings.

531* Chromic Acid Rinse Treatment. Radiometric Evaluation. S. L. Eisler. *Industrial Finishing (London),* v. 9, Sept. 1957, p. 818-821.

Radiochromium studies show the benefit of a chromic acid rinse as the final treatment in the phosphating process.

532 Layout and Space Requirements for Paint Finishing Systems. Allen S. Dawe and John A. Kinn. *Industrial Heating,* v. 24, Sept. 1957, p. 1831 + 5 pages.
(To be continued.)

533 The Linde Flame-Plating Process. H. J. Haycock and R. J. Fraser. *Machinery (London),* v. 91, Sept. 27, 1957, p. 738-742.

Process provides for the application of particles of W carbide or Al oxide by means of a special gun. The coatings can be applied to a variety of metals and are finding numerous applications where a high resistance to abrasion is required.

534 Water-Thinned Paints for Metal Products. *Materials in Design Engineering,* v. 46, Oct. 1957, p. 137-139.

New styrene-butadiene formulation seems to avoid earlier problems of metal corrosion.

535 An Examination of Oxide Films on Tin and Tinplate. S. C. Britton and K. Bright. *Metallurgia,* v. 56, Oct. 1957, p. 163-168.

Films formed in air at various temperatures and in passivating solutions were studied by controlled cathodic reduction which gives information about their rate of growth, and by examination of films detached from the metal to obtain evidence of their composition.

536* Dispersion, Distribution and Binding of Pigments in Emulsion Paint Films. W. C. Prentiss. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Oct. 1957, p. 951-965.

537* Solubility of Paint Resins in Hydrocarbon Solvents. W. W. Reynolds. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Oct. 1957, p. 966-979.

Thermodynamics of polymer solutions; solubility of alkyd resins; solubility parameter for petroleum solvents.

538* Styrene-Butadiene Latex for Baked Industrial Finishes. A. L. Cipriano, M. C. Carpenter, and P. H. Martin. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Oct. 1957, p. 980-994.

Latex properties; film formation; catalysis; film properties; compatability; formulation of Latex 566 paints; pigments; dispersing agents; manufacture, handling and storage; applications and formulations; automotive primers.

539* Transformation of Marine Oils Into Drying Oils. Josef Weiss. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Oct. 1957, p. 995-1017.

540* Shellac. C. C. Hartman. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Oct. 1957, p. 1028-1033.

Chemical nature of lac resin is described and several commercial forms are defined. Methods of manufacture, packaging, and storage of shellac varnish as well as its properties and applications are discussed.

541 Reaction Rates in Varnish Technology. D. F. Rushman. *Oil & Colour Chemists' Association, Journal,* v. 40, Oct. 1957, p. 814-829.

Factors governing the rate of reaction between two molecular species; how a third species may catalyze the reaction by open-

ing up a second reaction path. Interdependence of the various interchange reactions which occur in varnish or oil processing. Mode of action of anthraquinone in the catalysis of the dimerization of methyl linoleate.

542 Water-Dispersible Alkyds. F. Armitage and L. G. Trace. *Oil & Colour Chemists' Association, Journal*, v. 40, Oct. 1957, p. 849-862.

Very stable water-dispersed alkyd resins of particle size 0.5 to 1.0μ can be made by introducing polyethylene glycol into oil-modified alkyd resins; from these, high-gloss paints can be made. The presence of amphipathic solvents has a useful stabilizing effect.

543 Organic Aluminium Compounds in Drying Oils. J. Weiss. *Oil & Colour Chemists' Association, Journal*, v. 40, Oct. 1957, p. 863-879.

Use of Al alcoholates in surface-coatings. Properties and uses of a range of new synthetic drying oils. (To be concluded.)

544 New Synthetic Resins and Derivatives. *Paint Technology*, v. 21, Sept. 1957, p. 327-329.

Complexes of BF_3 cure aldehyde-hydrocarbon resins to products of higher melting-point than do acid catalysts. The preparation of organosilicon-modified alkyds derived from a mixture of succinic and sebacic acids is described. Polymerization of vinyloxy-esters in the presence of azo or acid catalysts gives thermoplastic resins suitable for coating purposes. Hydrolysis of these products leads to polyvinyl compounds containing both ether and hydroxyl groups, which are satisfactory sizing, binding, and finishing agents.

545 Hot-Dipped Aluminum Coatings. Herbert L. Kee. *Product Engineering*, v. 28, Oct. 28, 1957, p. 57-59.

Conditions they resist; base material; specific applications; suspension and methods of dipping; costs.

546 Chromate Conversion Coatings on Hot Dipped Galvanize. Charles W. Ostrander. *Products Finishing*, v. 22, Oct. 1957, p. 60 + 8 pages.

Coating has high corrosion protective ability and decorative value. A typical coating operation is outlined.

See also: **638** (organic coatings for metals); **896** (corrosion in boilers); **1008** (defects in enameling cast iron); **1029** (annealing of Cu films); **1435** (design of spray booths).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

547 Co-Ordinate Setting. *Aircraft Production*, v. 19, Oct. 1957, p. 384-388.

Control system for automatically positioning machine-tool slides at preselected positions.

548 Cycle-Selection. *Aircraft Production*, v. 19, Oct. 1957, p. 390-397.

Development of automatic cycle operation for general-purpose machines; application of sequence-controlled solenoid-operated air-valves.

549 Integrated Control. I. Development of Electro-Hydraulic Actuation and Sequence-Control for the Preselective Operation of a Boring-Mill. H. J. Pearson. *Aircraft Production*, v. 19, Oct. 1957, p. 412-422.

550* A New Method for Compensating Contactor Servomechanisms. J. N. Embler and C. H. Weaver. *Applications and Industry*, 1957, no. 32, Sept., p. 165-170.

A study of contactor servomechanisms using root loci obtained from curvilinear square plots of Kochenburger's "linearized" systems.

551 A Dynamic Performance Computer for Gas-Turbine Engines. V. L. Larrowe, M. M. Spencer, and M. Tribus. *ASME, Transactions*, v. 79, Oct. 1957, p. 1707-1714.

Standard analog computing equipment is combined with electro-mechanical "map readers" made from modified *X-Y* plotters to form the computer.

552 An Iterative Analogue Computer for Use With Resistance Network Analogues. I. C. Hutcheon. *British Journal of Applied Physics*, v. 8, Sept. 1957, p. 370-373.

Current adjustments are made automatically by a scanning switch, function generator, a.c. amplifier, and a set of triode valves each connected to a network node and having a memory capacitor connected to its grid.

553 The Analog Computer Aids Nuclear Plant Design. David W. Leiby. *Combustion*, v. 29, Sept. 1957, p. 34-43.

Basic theory of operation of the dual cycle boiling reactor power plant; methods of simulation by the analog computer; examples of transient performances as indicated from the simulation.

554 Information Theory Impact on Modern Communications. Pierre Mertz. *Communication and Electronics*, 1957, no. 32, Sept., p. 431-437.

A brief history and review of the subject.

555 Telemetering in Earth Satellites. Whitney Matthews. *Electrical Engineering*, v. 76, Nov. 1957, p. 976-981.

New instrumentation technique combining square hysteresis loop magnetic cores with switching transistors is discussed in description of magnetic telemetry encoding system.

556* Stepless Switching Interpolates Punched-Card Position Data as Continuous Tool-Path Analog. *Electrical Manufacturing*, v. 60, Oct. 1957, p. 116-123.

Utilizing precision toroidal autotransformers, induction potentiometers, and rotary switches, numerically programmed analog control has a resolution of 1 part in 100,000.

557 The Magnetic Tape Store for Pegasus. T. G. H. Braunholtz and D. Hogg. *Electronic Engineering*, v. 29, Oct. 1957, p. 484-489.

General description of computer tape store and some of the principal anticipated applications. Details of engineering and system design.

558 The Recording of Digital Information on Magnetic Drums. D. G. N. Hunter and D. S. Ridler. *Electronic Engineering*, v. 29, Oct. 1957, p. 490-496.

Methods of representing binary digital information on magnetic drums are discussed with regard to their reliability, cost, and technical merits.

559* (Russian.) A Frequency Supervisory Control Device With Synchronous Filters. **Chastotnoe ustroistvo teleupavleniia s sinkhronnymi fil'trami.** V. L. Inosov and A. M. Luchuk. *Elektrichestvo*, 1957, no. 9, Sept., p. 23-27.

A synchronous filter-generator built on the basis of crystalline triodes is described.

560 New Controls Cut Costly Downtime on Crushers and Grinding Mills. H. A. Wright. *Engineering and Mining Journal*, v. 158, Oct. 1957, p. 94-98.

New circuits devised to protect electric motors on crushers against voltage overloads and underloads, as well as mill overloads.

561 Trapped-Flux Superconducting Memory. J. W. Crowe. *IBM, Journal of Research and Development*, v. 1, Oct. 1957, p. 295-303.

A memory cell is constructed entirely by vacuum evaporation of thin films and can be selected by coincident current or by other techniques, with drive-current requirements of less than 150 ma.

562 An Analysis of the Operation of a Persistent-Supercurrent Memory Cell. R. L. Garwin. *IBM, Journal of Research and Development*, v. 1, Oct. 1957, p. 304-308.

563 A Binary-Weighted Current Decoder. E. J. Smura. *IBM, Journal of Research and Development*, v. 1, Oct. 1957, p. 356-362.

A novel method for driving cathode-ray-tube deflection yokes from digital equipment is reported.

564* Certain Results in Coding Theory for Noisy Channels. Claude E. Shannon. *Information and Control*, v. 1, Sept. 1957, p. 6-25.

Probability of error bound for the discrete finite memoryless channel; probability of error bound in terms of moment generating function; capacity of the finite state channel with state calculable at both terminals; capacity with state calculable at transmitter but not necessarily at receiver.

565 Flight Control System for Jet Transports. H. Miller and R. H. Wagner. *Institute of Radio Engineers, Transactions on Aeronautical and Navigational Electronics*, v. ANE-4, Sept. 1957, p. 118-126. (TK1 In6.6a Vis.)

Operation, design, and performance of the SP-30 control system for commercial and military jet transport aircraft.

566 The Relationship of Sequential Filter Theory to Information Theory and Its Application to the Detection of Signals in Noise by Bernoulli Trials. Herman Blasbalg. *Institute of Radio Engineers, Transactions on Information Theory*, v. IT-3, June 1957, p. 122-131. (TK1 In6.6it Vis.)

567 A Bibliography of Information Theory. (Communication Theory—Cybernetics). (Second Supplement). F. Louis H. M. Stumpers. *Institute of Radio Engineers, Transactions on Information Theory*, v. IT-3, June 1957, p. 150-166. (TK1 In6.6it Vis.)

568* An Analogue Computer for Nuclear Power Studies. G. J. R. MacLusky. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Sept. 1957, p. 433-442.

Design of reactor-kinetics, control-system, and thermal-system sections.

569* The Application of Analogue Methods to Compute and Predict Xenon Poisoning in a High-Flux Nuclear Reactor. G. J. R. MacLusky. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Sept. 1957, p. 443-446.

570* Computer-Assisted Production Control. W. J. Kease. *Instrument Practice*, v. 11, Sept. 1957, p. 925-936.

Considers the production control department in a company manufacturing heavy road vehicles, and the introduction of an electronic computing machine into its routine procedures of coordinating and regulating output.

571* First Computer-Controlled Power System. R. H. Travers and S. B. Yochelson. *ISA Journal*, v. 4, Oct. 1957, p. 454-458.

Use of an analog computer enabled the completely-automatic dispatching of electric power generation, including fuel costs, turbine and boiler characteristics, and transmission losses.

572* Telemetering for Interplanetary Flight. E. H. Krause. *ISA Journal*, v. 4, Oct. 1957, p. 478-480.

Reliability; long distance telemetry; data processing; phenomena related to propagation; telemetering in atomic defense.

573 Magnetic Writing on Thin Films of MnBi. H. J. Williams, R. C. Sherwood, F. G. Foster, and E. M. Kelley. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1181-1184.

A study of the domain structure of thin films (about 1000 A) of MnBi and their capability of storing information magnetically. It is estimated that a million bits of information could be written on a square centimeter of film. The information can be read out optically by utilizing the Faraday effect.

574* The Stabilization of Remote Position Control Systems by Proportional Coulomb Damping. E. A. Freeman. *Journal of Electronics and Control*, v. 3, Sept. 1957, p. 310-329.

Non-linear method is investigated analytically and by means of an electronic analog computer. Characteristics of the transient in response to a step function input are derived together with the stability criterion for any linear control system using this method of stabilization.

575* What About Numerical Control? III. William M. Stocker. *Metalworking Production*, v. 101, Sept. 20, 1957, p. 1701-1707.

Conclusions suggest that numerical control is but a logical step forward comparable with that from hand tools to machines.

576 Automatic Lens Design Methods. Donald P. Feder. *Optical Society of America, Journal*, v. 47, Oct. 1957, p. 902-912.

Proposes methods suitable for use with automatic computing machinery.

577* (German.) Three Point Control. **Dreipunktregelung.** K. Anke. *Regelungstechnik*, v. 5, no. 8, 1957, p. 262-264.

Non-linear unstable "three-point" control systems are examined. Feed-back networks are suggested which lead to practicable closed loop systems which are themselves stable.

578* (German.) The Use of an Electronic Simulator in Achieving Optimal Adjustment of a Controller. **Die Anwendung eines elektronischen Simulators auf das Problem der optimalen Reglereinstellung.** J. M. L. Janssen and R. P. Offereins. *Regelungstechnik*, v. 5, no. 8, 1957, p. 264-270.

579* (German.) The Time Behavior of a Linear Control Loop With Periodic Sensing Device. **Das zeitliche Verhalten eines linearen Regulkreises mit periodischem Taster.** S. Lehnigk. *Regelungstechnik*, v. 5, no. 8, 1957, p. 271-278.

The characteristics response and the disturbed response of a linear control loop with a periodic sampling element is shown in detail. The interpretation of the mathematical treatment shows the possible existence of stability areas in relation to the process (plant), controller, and impulse period of the sampling element.

580* (German.) A Method of Determining the Transient Characteristics of a Control Loop From Its Transfer Function or Frequency Response. **Die Ermittlung der dynamischen Kennwerte eines Regelkreises aus Übergangsfunktion und Frequenzgang.** K. Bopp. *Regelungstechnik*, v. 5, no. 9, 1957, p. 298-302.

Gives examples illustrating way of finding system dynamic characteristics such as time constant, dead time, and response lag, which are the transient factors determining system stability.

581 (Czech.) The "Regula" Automatic Control System. **Pneumatický regulačni systém Regula.** J. Edl. *Strojírenství*, v. 7, Aug. 1957, p. 573-580.

System for assembling different parts into various measuring and control units has great importance for the automation of industrial plants. It works with a coordinated air-pressure of 0.2 to 1.1 atm. and provides combinations for measuring or electric or electronic control.

582 Electrical Requirements for Automation in Arc Welding. R. W. Tuthill and R. D. Mann. *Welding Journal*, v. 36, Oct. 1957, p. 980-985.

See also: **230** (automation in petroleum refining); **590** (integrating motors); **786** (combustion servomechanisms); **847** (punched-card indexing system); **848** (electronic translation); **849** (mechanized literature searching); **894** (machine design with computers); **1472** (punched card sorter for polymer compounding); **1545** (labor and automation).

ELECTRICAL ENGINEERING

583 The Generation of Static Charge. W. R. Harper. *Advances in Physics*, v. 6, Oct. 1957, p. 365-417 + 3 plates.

A review of the various situations in which static charge is generated and theories of the mechanisms responsible.

584* (Russian.) Studying the Electric Conductivity of Sodium-Calcium-Magnesium-Alumosilicate Glass in the Temperature Range From 100 to 1200 C. **Issledovanie elektroprovodnosti natrii-kal'tsii-magnii-aliumosilikatnykh stekol v intervale 100-1200°C.** K. A. Kostanian. *Akademiia Nauk Armianskoi SSR, Izvestiia, Seriia Khimicheskikh Nauk*, v. 10, no. 3, 1957, p. 161-170.

Attempts to explain temperature behavior in accordance with Frenkel theory. Determination of temperature coefficient up to 850 C.

585* (Russian.) Changing of the Electric Properties of Rubber-Insulated Cables as a Result of Their Thermal Aging. **Izmenenie elektricheskikh kharakteristik kabelei s rezinovoi izoliatsiei v rezul'tate ikh teplovogo stareniia.** M. A.

Karapetian. *Akademiia Nauk Armianskoi SSR, Izvestiia, Seriia Tekhnicheskikh Nauk*, v. 10, no. 4, 1957, p. 69-74.

Thermal aging of cables decreases their dielectric losses and capacity.

586* (German.) The Electric Conductivity of Stable Organic Insulators. **Über die elektrische Leitfähigkeit fester organischer Isolatoren.** N. Riehl. *Annalen der Physik*, v. 20, nos. 1-6, 1957, p. 93-128.

Effects of temperature and field intensity on the conductivity of naphthalene single crystals, anthracene, paraffin, and polystyrene. Modification of the conductivity by melting. Photoconductivity. Production and recombination of thermal ions.

587* Prediction of Transient and Equilibrium Component Temperatures and Evaluation of Cumulative Insulation Damage of Blast-Cooled Machines. Walter Robinson. *Applications and Industry*, 1957, no. 32, Sept., p. 192-199.

588* Surface Heat-Transfer Coefficients of Salient Poles in a Blast-Cooled Alternator. W. Robinson and F. S. Tse. *Applications and Industry*, 1957, no. 32, Sept., p. 199-204.

Includes details of an experimental technique which may be used to gather heat-transfer data on all types of blast-cooled rotating and stationary component configurations employed in the design of aircraft electric machines.

589* (Russian.) Determining the Locations of Damage in a Cable With Radioactive Isotopes. **Opredelenie mest povrezhdeniia obolochek kabelei metodom radioaktivnykh izotopov.** A. V. Alekseev. *Avtomatika, Telemekhanika i Sviaz'*, 1957, no. 9, Sept., p. 3-5.

Method in which methyl bromide, marked with Br isotopes, and a radiometer are used. Methyl bromide is forced under pressure of 0.6 to 0.8 atm. into the cable, and the radiometer is used on the surface above the cable.

590 The Use of Low-Inertia Integrating Motors. R. F. Farr. *British Journal of Applied Physics*, v. 8, Sept. 1957, p. 366-369.

Relative advantages and performance of these small permanent-magnet motors which have, over a certain range, a speed proportional to the applied voltage. Current-voltage characteristics are used to derive the speed-voltage characteristic when it is driven by a voltage source of appreciable internal resistance.

591* (Russian.) Apparatus for Determination of Current-Conducting Inclusions in the Insulation Paper of a Condenser. **Pribor dlia opredeleniia tokoprovodiashchikh vkliuchenii v kondensatornoi bumage.** L. M. Vaisman and G. P. Doichenko. *Bumazhnaia Promyshlennost'*, v. 32, no. 7, July 1957, p. 10-13.

Design of apparatus; electrical scheme and method of determination of conducting inclusions. Tests show that the apparatus is sufficiently precise, has a high degree of reliability in service, and high productivity.

592 An Electronic Electrometer as a Versatile Corona Detector. J. G. Anderson and J. S. Kresge. *Communication and Electronics*, 1957, no. 32, Sept., p. 449-454.

Describes the detection and estimation of magnitudes of corona discharges in electric devices during high-voltage testing.

593 Insulation Phenomena of Compressed Air. L. D. McConnell. *Electrical Engineering*, v. 76, Nov. 1957, p. 984-987.

Various breakdown phenomena of air insulation encountered in the development of an air-insulated air-blast breaker. Methods used in the location, analysis, and correction of the breakdown. Use of insulating material in conjunction with high-pressure air.

594* Evaluation of Enameled Magnet Wire. Properties and Applications. H. L. Saums and W. W. Pendleton. *Electrical Manufacturing*, v. 60, Oct. 1957, p. 129-148.

Review provides extensive property data on polyurethanes, nylon, epoxies, acrylics, and polyesters, comparing advantages and disadvantages.

595* New Relay Forms for A-C Operation. Richard J. Coppola. *Electrical Manufacturing*, v. 60, Oct. 1957, p. 156-162.

Details for development of basically new forms of a.c. relays with electromagnetic design analysis.

596* Multi-Function Magnetic Amplifier Control for Large Motors. John Baude. *Electrical Manufacturing*, v. 60, Oct. 1957, p. 170-177.

Theory of the role of magnetic amplifiers in the control and protective circuits of large synchronous motors; circuit diagrams and descriptions of the complete system.

597* (Russian.) Determining Losses in Capacitors Subjected to Impulse Duty. **Opredelenie poter' v kondensatorakh pri impul'snom rezhime.** L. Z. Gogolitsyn. *Elektrichestvo*, 1957, no. 9, Sept., p. 41-45.

A new method is suggested based on the use of the superimposed principle. A non-sin-wave voltage, acting on the generator, is represented in a Fourier series as a sum of harmonic components, and the losses are determined for each harmonic by the formula for the sinusoidal voltage.

598* (Russian.) The Relay Effect in Circuits Regulating Temperature. **Releinyi effekt v skhemakh regulirovaniia temperatury.** G. K. Nechaev and D. V. Dorofeev. *Elektrichestvo*, 1957, no. 9, Sept., p. 53-54.

Study of the effect with two-position temperature regulation.

599* (Russian.) Calculating the Initial Voltages of Corona on a D.C. Line. **K raschetu nachal'nykh napriazhenii obshchei korony linii postoiannogo toka.** N. N. Tikhodeev. *Elektrichestvo*, 1957, no. 10, Oct., p. 12-19.

Mathematical analysis.

600* (Russian.) Certain Regularities of Faults in Electrical Machines. **O nekotorykh zakonomernostiakh avariinosti elektricheskikh mashin.** N. M. Dmitriev. *Elektrichestvo*, 1957, no. 10, Oct., p. 29-33.

Effects of types of insulation and external conditions on faults in electrical equipment.

601* (Slovak.) Interesting Method of Synchronization of Asynchronous Ring-Armature Motors. **Zaujímavý spôsob synchronizácie asynchrónneho krúžkového motora.** Václav Kalaš. *Elektrotechnik*, v. 12, no. 9, Sept. 1957, p. 276-282.

Fundamentals and experiments with standard synchronization of a large asynchronous motor for improvement of the power factor.

602* (Hungarian.) Short-Circuit Currents in Turbo Generators. **Turbógenerátorok rövidzárlati áramai.** Jaroslav Kučera. *Elektrotechnika*, v. 50, no. 4, Apr. 1957, p. 131-137.

Calculation of short-circuit currents by means of tensor and operational calculus.

603* (German.) Modern High-Voltage Fluorescent Tubes. **Die modernen Hochspannungs-Leuchtröhren.** Gerhard Gut and Kurt Kolbe. *ETZ, Elektrotechnische Zeitschrift*, v. 9, Ausgabe B, Sept. 1957, p. 353-357.

General discussion of manufacture and use in signs and lighting fixtures.

604* Uses of New Mercury Lamps. D. R. Phillips and E. C. Martt. *Illuminating Engineering*, v. 52, Oct. 1957, p. 519-526.

With color-improved mercury lamps, the lighting user has a way to reduce maintenance and lighting costs, to improve color rendition, and to obtain economically a lighting system with improved visual comfort.

605* Experience With High Level Office Lighting. J. M. Ketch and W. S. Fisher. *Illuminating Engineering*, v. 52, Oct. 1957, p. 529-534.

Indoor installations are compared with "shade-of-a-tree" illumination levels. Concludes that higher level lighting can be acceptably comfortable for most office tasks.

606* Switching Transients in Three-Phase Induction Motors Run on Single Phase Supply. P. Venkata Rao. *Indian Institute of Science, Journal*, v. 39, sec. B, July 1957, p. 101-119.

Results are in striking contrast with those attained earlier with a plain general-purpose capacitor motor.

607* Studies in the Operating Characteristics of Pre-Heat Hot Cathode Fluorescent Tube Circuits. II. C. G. Ramaswamy. *Indian Institute of Science, Journal*, v. 39, sec. B, July 1957, p. 120-133 + 2 plates.

Advantages of high frequency operation and some of the attendant problems are discussed.

608* The Electric Strength of Silicone Liquids. T. J. Lewis. *Institution of Electrical Engineers, Proceedings,* v. 104, pt. B, Sept. 1957, p. 493-497.

Liquids tested were the four lower members of the D.C. 200 series of silicone fluids having viscosities of 0.65, 1, 1·5, and 2 centistokes. The strength, of the order of 900 kv. per cm., was found to increase with chain length and with decreasing test-gap.

609* Transformer-Type Equivalent Networks. C. E. Moorhouse. *Institution of Electrical Engineers, Proceedings,* v. 104, pt. C, Sept. 1957, p. 265-270.

Various equivalent circuits used, or suggested, for transformers and induction motors are examined by considering them as 4-terminal networks, and determining the corresponding general circuit constants by matrix methods.

610* Properties of Some D.C.-A.C. Chopper Circuits. I. C. Hutcheon. *Institution of Electrical Engineers, Proceedings,* v. 104, pt. C, Sept. 1957, p. 289-298.

Analyzes five basic types of chopper circuit suitable for converting low-level direct voltages to alternating voltages.

611* Theory and Equivalent Circuits of the Stator-Fed Polyphase Shunt Commutator Motor. C. S. Jha. *Institution of Electrical Engineers, Proceedings,* v. 104, pt. C, Sept. 1957, p. 305-315.

612* Simulation of the Transient Performance of Synchronous Machines on an A. C. Network Analyser. Colin Adamson and A. M. S. El-Serafi. *Institution of Electrical Engineers, Proceedings,* v. 104, pt. C, Sept. 1957, p. 323-331.

Simulator enables obtaining the symmetrical a.c. transient component of current or voltage of a synchronous machine, subsequent to any 3-phase disturbance.

613* The Electrical Breakdown of Gaseous Dielectrics at High Frequencies. R. R. T. Fatehchand. *Institution of Electrical Engineers, Proceedings,* v. 104, pt. C, Sept. 1957, p. 489-495.

The continuous-wave breakdown of air and an air/carbon-tetrachloride mixture in uniform electric fields is examined at frequencies between 3.5 and 30 mc. per sec.

614 Marine Electrical Practice. G. O. Watson. 325 p. 1957. Philosophical Library, New York. (VM471 W33m)

Covers generators, switchgear, motors and motor control, batteries, lighting, cables and distribution systems, and electrically-driven auxiliaries.

615* (German.) Theoretical Bases of Electric Production of Heat. **Theoretische Grundlagen der Elektrowärmeerzeugung.** Anton Leitner. *Maschinenbau und Wärmewirtschaft,* v. 12, Sept. 1957, p. 245-261.

Consumption of energy in heating. Heat production by means of electric current. Inductive and capacitive heating. Steady and unsteady state heat transfer calculations.

616 Supereonductivity of Uranium. R. A. Hein, W. E. Henry, and N. M. Wolcott. *Physical Review,* v. 107, ser. 2, Sept. 15, 1957, p. 1517-1520.

A ballistic mutual-inductance technique was employed to investigate the magnetic susceptibility of two U samples down to a temperature of 0.1 K. Both samples exhibited a superconducting transition in zero magnetic field at a temperature of 0.68±0.02 K.

617 Current-Capacitance Characteristics of Metal Rectifiers. Yoshiro Moriguchi and Atuyosi Okazaki. *Physical Society, Proceedings,* v. 70, no. 454B, Oct. 1957, p. 991-999.

Substitution bridge method was used for measurements at room and liquid air temperatures. At low temperatures the capacitance of Cu_2O and Se rectifiers, and the reverse current of the former, decrease, but that of the latter increases.

618 Motor Generators for Electroplating. I. H. E. Head. *Products Finishing,* v. 22, Oct. 1957, p. 44 + 6 pages.

Principles, construction, and historical review.

619* (German.) Physical Processes in Electric Arcs. **Über physikalische Vorgänge in Lichtbögen.** R. Wienecke. *Schweissen und Schneiden,* v. 9, Sept. 1957, p. 428-434.

Dissociation and other properties of gases. Equilibrium of the plasma. Temperature conditions in the electric arc. Thermal conductivity and its dependence on temperature. Flow effects in arcs.

620* (Russian.) The Nature of the High Dielectric Permeability of Some Solid Solutions With Seignetto-Electrical Properties. **K voprosu o prirode vysokoi dielektricheskoi pronitsaemosti nekotorykh tverdykh rastvorov, obladaiushchikh segnetoelektricheskimi svoistvami.** V. A. Bokov. *Zhurnal Tekhnicheskoi Fiziki,* v. 27, no. 8, Aug. 1957, p. 1784-1793.

Study of the dependence of properties on temperature in weak electric fields for several solid solutions: (Ba, Sr)TiO_3, Ba(Ti, Sn)O_3, and Ba(Ti, Zr)O_3. Dependence of hysteresis losses on voltage of the alternating field during one cycle. In the region of low fields the losses are directly proportional to the cube of the field voltage.

See also: **2** (cooling system for aircraft generators); **188** (electrical and magnetic ceramics); **189** (dielectric properties of CaO-BaO-LiO_2 system); **202** (dielectric properties of glass); **571** (control of electric power system); **629** (maintenance of electroplating equipment); **633** (electroplating of printed circuits); **946** (corrosion of telephone cables); **1404** (fluorocarbon laminates for printed circuits).

ELECTROCHEMISTRY

621 Electrodeposited Foils for Use as Magnetic Materials in Communication Technology. F. Khol. *Henry Brutcher Translation No.* 3974, 10 p. (From *Slaboproudý Obzor,* v. 16, no. 6, 1955, p. 323-327.) Henry Brutcher, Altadena, Calif.

Production of foils of pure Fe or Fe-Ni compositions by electrolytic deposition. Magnetic properties as function of heat treatment of foils.

622 Voltaic Cells in Fused Salts. I. The Silver-Silver Chloride, Cobalt-Cobaltous Chloride System. S. N. Flengas and T. R. Ingraham. *Canadian Journal of Chemistry,* v. 35, Oct. 1957, p. 1139-1149.

623 Potential-pH Diagram of the Antimony-Water System. Its Applications to Properties of the Metal, Its Compounds, Its Corrosion, and Antimony Electrodes. Arthur L. Pitman, Marcel Pourbaix, and Nina de Zoubov. *Electrochemical Society, Journal,* v. 104, Oct. 1957, p. 594-600.

624 Filamentary Growths on Copper Cathodes. T. C. J. Ovenston, C. A. Parker, and A. E. Robinson. *Electrochemical Society, Journal,* v. 104, Oct. 1957, p. 607-611.

Investigation was made of the filamentary growths which are produced under certain conditions during Cu plating at low current density; mechanisms for the formation of the filaments were discussed.

625 Electrical Conductivity of Molten Fluorides. I. Apparatus and Method. II. Conductance of Alkali Fluorides, Cryolites, and Cryolite-Base Melts. Ernest W. Yim and Morris Feinleib. *Electrochemical Society, Journal,* v. 104, Oct. 1957, p. 622-630.

Hot-pressed boron nitride was used to fabricate high-resistance cells with constants ranging from 17 to 39 $cm.^{-1}$. Such cells must be used under an inert atmosphere. A furnace and apparatus for accomplishing these objectives are described. An a-c Wheatstone bridge is used for measurements. Conductivities of molten LiF, NaF, KF, Li_3AlF_6, $NaAlF_6$, and K_3AlF_6 were determined.

626* Mechanism of Electrochemical Polishing. *Industrial Finishing (London),* v. 9, Sept. 1957, p. 802-803. (Translated from *Zhurnal Prikladnoi Khimii,* v. 30, no. 4, 1957, p. 528-533.)

627* (French.) A Theoretical Study of the Kinetics of Electro-Chemical Reduction by the Constant Current Method. **Étude théorique de la cinétique de la réduction électrochimique par la méthode a courant constant.** Georges Feuillade. *Journal de Chimie Physique,* v. 54, July-Aug. 1957, p. 620-632.

Irreversible electrolytic reactions. Kinetics of reduction and oxidation.

628* (French.) Relationship Between the Acetylene Strength of the Calcium Carbide and the Consumption of Electric Power, and Information on the Effect of the Quality of Raw Materials. **Relation entre le titre en acétylène du carbure de calcium et la consommation d'énergie électrique avec quelques apercus sur l'influence de la qualité des matières premières.** Stanislas Bokszczanin. *Journal du Four Electrique*, v. 62, July-Aug. 1957, p. 123-128.

Problems in electrochemical production of Ca_2C. Attempts to make a pure carbide with moderate power consumption. Reduction of losses of raw materials.

629 Maintenance of Electrical Equipment in the Plating Room. Joseph F. Day. *Metal Finishing*, v. 55, Oct. 1957, p. 65 + 4 pages.

Motor generators, meters, shunts and rheostats, rectifiers, and regulators are discussed.

630* (German.) Observations Made During the Electrolytic Polishing of Metals. **Beobachtungen beim elektrolytischen Polieren von Metallen.** H. Mühlberger. *Metall*, v. 11, Sept. 1957, p. 756-761.

Effects of the velocity of the electrolytic flow on the current-voltage curve. Phenomena occurring during the electrolytic polishing of Cu and brass in phosphoric acid. Theory of the surface layer. Polishing mechanism.

631* (German.) Principles Underlying Acid Copperplating and the "Cupatier" Method. **Die Grundlagen der sauren Verkupferung und das Cupatier-Verfahren.** W. Strauss and E. Roth. *Metalloberfläche*, v. 11, Sept. 1957, p. 281-285.

Theoretical basis of the heavy-duty Cu bath; influence of polishing inhibitors. Methods for direct copperplating of Fe from Cu electrolytes by means of the sulfuric Cu bath industrially known as "Cupatier" process.

632* (German.) A Contribution to the Problem of the Current Distribution in Concentrated Electrolytic Solutions. **Beitrag zur Frage der Stromverteilung in konzentrierten Elektrolyt-Lösungen.** P. Csokán. *Metalloberfläche*, v. 11, Sept. 1957, p. 285-288.

Historical survey of the problem. Electrolytic cell experiments with Cu and Cr baths, with and without a separating sheet and with different voltages. Applications to Pb, Sn, and bronze baths.

633 The Plater's Art in Printed Circuitry. Nelson Foran. *Plating*, v. 44, Oct. 1957, p. 1071-1078.

Methods, requirements, and problems of electroplating the printed circuit.

634 Automatic Plating. *Precision Metal Molding*, v. 15, Oct. 1957, p. 54 + 2 pages.

Die-castings finishing is accomplished in 28 operations.

635* (Russian.) New Bath Composition for Electro-Polishing of Aluminum. **Novyi sostav vanny dlia elektropolirovaniia aliuminiia.** L. E. Levin and I. G. Rudak. *Priborostroenie*, 1957, no. 8, Aug., p. 25.

Testing of two baths based on ethylene glycol, one containing phosphoric and sulfuric acids and ethylene glycol, and the other containing phosphoric acid and ethylene glycol without sulfuric acid. The electropolishing in baths with a stationary anode leads to surface defects in the metal; with moving anodes a smooth surface without any defects is produced.

636 Plated Finishes. The Choice Widens. Robert T. Gore and Robert M. MacIntosh. *Product Engineering*, v. 28, Oct. 28, 1957, p. 81-84.

Properties and applications of alloy and singlemetal electroplates.

637 (Czech.) Automatic Control of Current Density in Electrochemical Processes of Surface Finishing. **Automatická regulace proudové hustoty v elektrochemických procesech povrchové úpravy.** Jar. Binko. *Strojírenství*, v. 7, Aug. 1957, p. 603-606.

Theoretical and economic aspects. Use of measuring electrodes. Current density is regulated on the basis of the shape and dimension of the articles to be plated.

638 Transactions of the Institute of Metal Finishing. v. XXXIII. 495 p. 1955-1956. Institute of Metal Finishing, London. (TS670 E25j Vis.)

Includes 24 papers on electrodeposition, anodizing, chemical cleaning and polishing plant design, and painting.

639* (Russian.) A Study of Electrode Processes During Electrolytic Refining of Aluminum. **Izuchenie elektrodnykh protsessov pri elektrolitícheskom rafinirovanii aliuminiia.** V. A. Garmata and A. I. Beliaev. *Tsvetnye Metally*, v. 30, no. 9, Sept. 1957, p. 58-66.

Study of cathodic and anodic polarizing curves. Determination of reverse e.m.f. and polarization of electrodes in industrial electrolyzers. Investigation of specific conductivity, density, and crystallization temperature of chlorine and fluorine electrolytes.

640* (Russian.) The Effect of Boric Acid on Cathodic Polarization in the Electrodeposition of Cobalt and Nickel. **Vliianie bornoi kisloty na katodnuiu poliarizatsiiu pri elektroosazhdenii kobal'ta i nikelia.** Z. A. Solov'eva and O. A. Abrarov. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 6, June 1957, p. 1248-1255.

Effect was studied in relation to the pH of the solution, boric acid concentration, temperature, and current density.

641* (Russian.) Cathodic Process During the Electrodeposition of Iron-Nickel Alloy. **O katodnom protsesse pri elektroosazhdenii splava zhelezo-nikel'.** N. V. Korovin. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 9, Sept. 1957, p. 2259-2263.

Simultaneous deposition of Fe and Ni from electrolytes containing Na citrate.

See also: **618** (motor generators for electroplating); **957** (electrochemistry and corrosion); **1125** (Cr plating of cutting tools); **1146** (structure of anodic coating on Al); **1183** (twin structure of Ni films on Cu single crystals); **1207** (porosity in Cr plating); **1219** (thickness measurement of anodic film on Al); **1446** (disposal of plating wastes).

ELECTRONICS

642* Mechanical Crossover Characteristics in Dual Diaphragm Loudspeakers. Abraham B. Cohen. *Audio Engineering Society, Journal*, v. 5, Jan. 1957, p. 11-17.

Role of diaphragm shape and material. Frequency response curves for conical and curvilinear diaphragms where compliances at the apex were modified. Effect of auxiliary diaphragm.

643* Tape Storage Problems. Frank Radocy. *Audio Engineering Society, Journal*, v. 5, Jan. 1957, p. 32-35.

Prolonged storage produces no apparent increase in the distortion content of recorded material; print-through increases with time, and is aggravated by stray magnetic field and high temperatures.

644* Coincident Sound for Home Movies Provided by Tape Recorders. James N. Whitaker. *Audio Engineering Society, Journal*, v. 5, Jan. 1957, p. 36-41.

Describes a simple, widely applicable regulator system for recording sound, in which a high degree of synchronization is assured; auxiliary head simultaneously records a 60 c.p.s. tone derived from the projector power source upon the adjoining track.

645 Miniaturized Tantalum Solid Electrolytic Capacitors. Florence S. Power. *Bell Laboratories Record*, v. 35, Oct. 1957, p. 419-422.

Capacitors for use in low-voltage transistorized circuits store more charge per unit volume than any other capacitor. They have good shelf life and potentially high reliability, maintain their properties at very low temperatures, and have high efficiency values at high frequencies.

646 Theory of Curved Circular Waveguide Containing an Inhomogeneous Dielectric. Samuel P. Morgan. *Bell System Technical Journal*, v. 36, Sept. 1957, p. 1209-1251.

647 Circular Electric Wave Transmission in a Dielectric-Coated Waveguide. H. G. Unger. *Bell System Technical Journal*, v. 36, Sept. 1957, p. 1253-1278.

648 The Effect of Oxygen and Sulphur on the Thermionic Emission From Matrix Cathodes. J. F. Richardson. *British Journal of Applied Physics*, v. 8, Sept. 1957, p. 361-362.

The poisioning of the emission from matrix cathodes by O and S is reversible. The shape of the recovery curves indicates that the poisoning agent is present on the surface and has also diffused into the cathode pores.

649 The Operation of the Current-Type Self-Balancing Magnetic Amplifier. Albert D. Krall. *Communication and Electronics*, 1957, no. 32, Sept., p. 380-384.

650* (French.) Resistivity and Hall Effect of Thin Indium Antimonide Films. **Résistivité et effet Hall des lames minces d'antimoniure d'indium.** Jacques Launey and Antoine Colombani. *Comptes Rendus*, v. 245, Sept. 16, 1957, p. 1009-1011.

Deposits were annealed in vacuum and a study made of the thermal evolution and resistivity (7.10^{-3} Ω/cm approximately). The Hall effect increased with the annealing temperature and was proportional to the current intensity.

651* (French.) Electron Dispersion by Optical Means in Indium Antimonide. **Sur la dispersion des électrons par les modes optiques dans l'antimoniure d'indium.** Michel Rodot. *Comptes Rendus*, v. 245, Sept. 23, 1957, p. 1051-1056.

Measuring the magnetothermoelectric and Nernst effects in InSb. The electrons are dispersed by the optical vibration of the network.

652 Design Manual of Natural Methods of Cooling Electronic Equipment. James P. Welsh. 188 p. 1956. Department of the Navy, Bureau of Ships, Washington, D. C. (TK7870 C81d Over.)

This is the fourth report in a series of publications intended to guide designers of electronic equipment in the use of convection, conduction, and radiation heat transfer methods. These publications are written for electronics personnel who are not well versed in thermodynamics.

653* Transistors in Airborne Power Supplies. M. S. Chester and Jewel W. Moody. *Electrical Manufacturing*, v. 60, Oct. 1957, p. 149-153.

Circuit and transformer designs for a transistorized high-voltage power supply and for a transistorized d.c. to d.c. converter.

654 High Frequency Crystal Filters. *Electromechanical Design*, v. 1, Sept.-Oct. 1957, p. 12-17.

New solutions for design problems in communication, navigation, Doppler radar, fire control, missiles, carrier telephones, telemetering, spectrum analysis, and data handling systems.

655 Printed Wiring Design. *Electromechanical Design*, v. 1, Sept.-Oct. 1957, p. 74-78.

New photographic technique for designers.

656 Superconductivity: Its Applications to Electric Circuits. Howard O. McMahon. *Electromechanical Design*, v. 1, Sept.-Oct. 1957, p. 98 + 3 pages.

Superconductors as circuit components; principal problems of superconductive circuits.

657 Applications of a New Type of Cold Cathode Trigger Tube. K. F. Gimson and G. O. Crowther. *Electronic Engineering*, v. 29, Oct. 1957, p. 462-468.

Tube has a trigger ignition voltage which is very stable over long periods and is therefore suitable for use in accurate RC timers, overvoltage detectors, voltage regulators, relaxation oscillators, and sensitive relay units. (To be continued.)

658 V.H.F. Line Measurements. (A New Method). F. J. Charman. *Electronic Engineering*, v. 29, Oct. 1957, p. 499-503.

Device gives a measure of the impedance or admittance components of the unknown load in a form suitable for graphical solution, but not directly applicable to a Smith chart. Certain advantages tend to make it more accurate than the impedometer.

659* Drift-Corrected D. C. Amplifier. M. H. McFadden. *Electronic & Radio Engineer*, v. 34, Oct. 1957, p. 358-364.

The need for drift correction; basic cascade circuit; phase and gain characteristics; alternative circuit.

660* Waveguide Characteristics. A. E. Karbowiak. *Electronic & Radio Engineer*, v. 34, Oct. 1957, p. 379-387.

Exact formulas and curves for the attenuation and phase propagation coefficients.

661* An All-Pass Network. W. Proctor Wilson. *Electronic & Radio Engineer*, v. 34, Oct. 1957, p. 391-394.

Transient response in terms of a finite series of Laguerre functions.

662* (Russian.) Balancing Anode Modulation. **Balansnaia anodnaia moduliatsiia.** A. A. Pirogov. *Elektrosviaz'*, v. 11, no. 10, Oct. 1957, p. 14-20.

A method to increase the effectiveness of a radio transmitter working on short and ultra-short waves.

663* (Russian.) Fading of Ultra-Short Waves in a Radio Relay Communication System. **O zamiraniiakh ul'trakorotkikh voln na radioreleinykh liniiakh sviazi.** V. N. Troitskii. *Elektrosviaz'*, v. 11, no. 10, Oct. 1957, p. 32-37.

Analysis of possible kinds of fading. A general statement is derived for the effective gradient of the specific inductive capacitance.

664* (Hungarian.) Thermo-Electric Generators With Semiconductive Materials. **Hovillamos generátorok — félvezeto anyagokból.** József Lukács. *Elektrotechnika*, v. 50, no. 4, Apr. 1957, p. 121-130.

Industrial applications. Efficiency of various materials. Possibility of building a generator by taking advantage of the Nernst-Ettingshausen effect.

665* (German.) The Transistor as a Dependable Element for Controlling Devices. **Der Transistor, ein zuverlässiges Bauelement für Steuer- und Regelgeräte.** Otto Harr. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, Sept. 1957, p. 649-651.

Construction, properties, and application of transistors.

666* (Russian.) On the Question of Anisotropy of Electric Conductivity in Ferromagnetics. **K voprosu ob anizotropii elektroprovodnosti v ferromagnetikakh.** K. P. Rodionov and V. G. Shavrov. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 385-391.

Theoretical study based on concrete type of energy spectrum of conduction electrons.

667* (German.) Multiplication of Frequency Modulated Oscillations Over an Extremely Large Range of Frequencies. **Vervielfachung frequenzmodulierter Schwingungen über einen extrem grossen Frequenzbereich.** Helmut Schönfelder. *Frequenz*, v. 11, Sept. 1957, p. 274-278.

A 100 kHz X 100 MHz multiplier was used for the study of problems occurring in the multiplication of frequency modulated oscillation in a simple cascade over a wide frequency range.

668 An Improved High-Gain Panel Light Amplifier. B. Kazan. *I.R.E., Proceedings*, v. 45, Oct. 1957, p. 1358-1364.

A grooved photoconductor light-amplifying picture panel is described, whose gain is more than ten times greater than any previous amplifier and whose threshold for input light is reduced.

669 The Large-Signal Behavior of Crossed-Field Traveling-Wave Devices. J. Feinstein and G. S. Kino. *I.R.E., Proceedings*, v. 45, Oct. 1957, p. 1364-1373.

670 Radio Propagation Above 40 MC Over Irregular Terrain. John J. Egli. *I.R.E., Proceedings*, v. 45, Oct. 1957, p. 1383-1391.

Available statistical wave propagation information on terrain effects vs. frequency, antenna height, polarization, and distance is analyzed.

671 Design Theory for Depletion Layer Transistors. Wolfgang W. Gärtner. *I.R.E., Proceedings*, v. 45, Oct. 1957, p 1392-1400.

Conceivable structures and modes of operation for DLT's are described and the potential importance of the depletion layer principle for solid-state microwave amplification is emphasized.

672 A 60KW Transmitter for Ionospheric Scatter Communications. J. L. Hollis, W. H. Collins, and A. R. Schmidt. *Institute of Radio Engineers, Transactions on Communications Systems*, v. CS-5, Sept. 1957, p. 3-9. (TK1 In6.6cs Vis.)

This simple fixed frequency transmitter delivers 60KW peak envelope power in linear or CW service for use on important point-to-point communications circuits utilizing V.H.F. scatter techniques.

673 Some Properties of a Frequency Stabilizing Circuit. L. Lorne Campbell. *Institute of Radio Engineers, Transactions on Communications Systems*, v. CS-5, Sept. 1957, p. 10-12. (TK1 In6.6cs Vis.)

The signal-to-noise ratio at the output of this circuit is related to the signal-to-noise ratio at the input in about the same way as these ratios are related in a square-law detector.

674 Practical and Theoretical Design Considerations for Bridge Negative Feedback Amplifiers in Carrier Telephony. M. J. Cotterill and J. W. Halina. *Institute of Radio Engineers, Transactions on Communications Systems*, v. CS-5, Sept. 1957, p. 26-31. (TK1 In6.6cs Vis.)

675 Point Contact Rectifier Theory. Melvin Cutler. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, July 1957, p. 201-206. (TK1 In6.6ed Vis.)

Theoretical analysis of the forward characteristics at moderately high currents, and the breakdown in the reverse direction.

676 Junction Capacitance and Related Characteristics Using Graded Impurity Semiconductors. Lawrence J. Giacoletto. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, July 1957, p. 207-215. (TK1 In6.6ed Vis.)

677 Noise Wave Excitation at the Cathode of a Microwave Beam Amplifier. Walter R. Beam. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, July 1957, p. 226-234. (TK1 In6.6ed Vis.)

General equations are derived, giving the amplitudes of noise current and velocity for the many modes of space-charge wave propagation in an electron beam. Properties of the cathode taken into consideration are the current density and the emission velocity distribution as a function of position.

678 Design and Calculation Procedures for Low-Noise Traveling-Wave Tubes. L. D. Buchmiller, R. W. Degrasse, and G. Wade. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, July 1957, p. 234-242. (TK1 In6.6ed Vis.)

679 Traveling-Wave Amplifiers and Backward-Wave Oscillators for VHF. Donald A. Dunn. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, July 1957, p. 246-264. (TK1 In6.6ed Vis.)

680 Beam Perturbations in Confined Flow Electron Beams With Planar Symmetry. D. A. Dunn and W. R. Luebke. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, July 1957, p. 265-270. (TK1 In6.6ed Vis.)

An analysis of the perturbations in a confined flow beam from a two-anode gun as a result of lens effects at the gun apertures is presented for the case of parallel flow with planar symmetry.

681* Photo-Electric Cells. A Review of Progress. J. D. McGee. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Sept. 1957, p. 467-484.

Modern theory of the photo-electric effect. Methods of making modern photoelectric cathodes, their characteristics, and those of a few of the electronic tubes in which they are incorporated. Photo-conductive and photo-voltaic cells.

682* Growth of Anode-to-Grid Capacitance in Low-Voltage Receiving Valves. F. H. Reynolds, C. B. Johnson, and M. W. Rogers. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Sept. 1957, p. 487-492.

Anode-to-grid capacitance increases with life, rate of growth being dependent on operating conditions of the valve and on material and processing schedule of the anode. Phenomenon is due to transfer of impurity carbon from the anode to the mica insulators.

683* Influence of Argon Content on the Characteristics of Glow-Discharge Tubes. F. A. Benson and E. F. F. Gillespie. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Sept. 1957, p. 498-506.

Effects of varying the argon content of glow-discharge stabilizer tubes on the striking and running voltages, the magnitudes and durations of the initial drifts, the running-voltage/temperature, and running-voltage/current curves, and the impedance/frequency and noise characteristics.

684* The Diffraction of an Electromagnetic Wave by a Large Aperture. R. F. Millar. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 240-250.

An approximate expression is obtained for the difference from unity of the transmission coefficient for plane waves at normal incidence of a large aperture of rather general form in a plane perfectly-conducting screen. The case of an elliptical aperture is examined in detail.

685* The Relationship Between Cathode Emission, Cathode Resistance and Mutual Conductance in Receiving Valves. M. F. Holmes. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 251-264.

686* The Conductivity of Oxide Cathodes. I. Potential Distribution. G. H. Metson. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 316-322.

Using active-Ni cores to enclose a rectangular slab of barium-strontium oxide, it is found by probe experiments that non-uniformity of potential gradient occurs only in the presence of residual gas, and that the gradient tends to increase in those parts of the matrix likely to accumulate negative ions.

687* Propagation of Transients in Waveguides. A. E. Karbowiak. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 339-348.

Basic theory is formulated and applied to the propagation of a unit-step-modulated carrier and the propagation of pulses.

688* Design Data for Symmetrical Darlington Filters. J. K. Skwirzynski and J. Zdunek. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 366-380.

The values of components in terms of generalized frequency and load conditions are found for symmetrical equally terminated filters consisting of reactances only. Filters are designed on the basis of Darlington's insertion-loss theory with Chebyshev behavior both in the pass band and in the attenuation band.

689* Mode Separation at the π-Mode in a Dielectric Loaded Waveguide Cavity. G. B. Walker and N. D. West. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 381-387.

690* Synchronized Systems With Time Delay in the Loop. Z. J. Jelonek and C. I. Cowan. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 388-397.

Stability and the pulling effect in a synchronized oscillator with a time-delay network in the loop are investigated analytically, graphically, and with the help of an analog. The corresponding non-linear hystero-differential equation is studied and typical solutions are presented on the phase plane.

691* Distortion Due to the Mismatch of Transistors in Push-Pull Audio-Frequency Amplifiers. K. W. Gurnett and R. A. Hilbourne. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 411-422.

692* An Improved Design Procedure for the Multi-Section Generalized Microwave Filter. R. Levy. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 423-432.

A highly accurate expression for the Q-factor of a direct-coupled filter is derived which is analogous to that for an associated quarter-wave-coupled filter. Design formulas are given for the band width, pass-band tolerance, and the attenuation in the rejection band for both types of filter.

693* Fundamental Radio Scatter Propagation Theory. E. C. S. Megaw. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 441-455.

694* An Instrument for the Absolute Measurement of Low-Level Microwave Power in the 3cm Band. A. L. Cullen and H. A. French. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. C, Sept. 1957, p. 456-464.

695 Analysis of Multivelocity Electron Beams by the Density-Function Method. A. E. Siegman. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1132-1138.

Some techniques for simplifying the solution of the a.c. density-function equation, including two methods for extracting various singular terms from the equation.

696 Effect of Irradiation on the Hole Lifetime of *N*-Type Germanium. O. L. Curtis, Jr., J. W. Cleland, J. H. Crawford, Jr., and J. C. Pigg. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1161-1165.

697 Backscattering of 5-20 kev Electrons From Insulators and Metals. J. E. Holliday and E. J. Sternglass. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1189-1193.

Electron backscattering measurements were carried out on composite layers consisting of thin metal films deposited on base layers of widely different backscattering properties. Data on LiF, $Zn_3(PO_4)_2$, KCl, RbBr, and TlI above 5 k.e.v. demonstrate that backscattering in the k.e.v. range and above is an atomic characteristic independent of the crystal structure or the conduction properties of the solid.

698* Interdigital and Other Slow Wave Structures. J. C. Walling. *Journal of Electronics and Control*, v. 3, Sept. 1957, p. 239-258.

Development and application of method of calculating the properties of slow wave structures consisting of arrays of parallel conductors.

699* Geometrical Effects in Transverse Magnetoresistance Measurements. J. R. Drabble and R. Wolfe. *Journal of Electronics and Control*, v. 3, Sept. 1957, p. 259-266.

The effect of finite length-to-width ratio and of probe positions on measurements of resistivity in a transverse magnetic field is investigated for various Hall angles.

700* An Experimental High Power Pulsed Travelling Wave Tube. J. F. Gittins, N. H. Rock, and A. B. J. Sullivan. *Journal of Electronics and Control*, v. 3, Sept. 1957, p. 267-286.

Essential features of this tube are a massive slow wave structure capable of working with a high voltage electron beam in a fundamental mode and an attenuator with good heat dissipation which occupies the minimum length along the electron beam.

701 What's Ahead in Semiconductors. Robert Willardson. *Military Electronics*, v. 4, Oct. 1957, p. 16 + 4 pages.

Appraises the present situation in semiconductors, discusses new materials and their properties, and assesses the outlook for the future. While Ge, Se, and Si are currently well known, such intermetallics as InP, GaAs, and AlSb promise to be strong challengers after more research. Surveys applications in conversion of light energy, infra-red optics and detectors, low and high temperature electronics, and thermistors. Data on 19 semiconductors are tabulated.

702 A Lexicon for Reliability. James C. Kinkaid. *Military Electronics*, v. 4, Oct. 1957, p. 34 + 4 pages.

Needs and suggestions for standardization of common terms.

703 Evaluating Relays for Guided Missiles. D. D. Zimmerman. *Military Electronics*, v. 4, Oct. 1957, p. 40-42.

Development of a procedure intended as a universal method of analyzing characteristics of electromagnetic units for weapon purposes.

704* (English.) Non Linear Effects in Vacuum Polarization. II. A. Minguzzi. *Nuovo Cimento*, v. 6, ser. 10, Sept. 1957, p. 501-511.

Analysis of propagation of electromagnetic waves in a constant magnetic field region. Some analytical properties of the "dielectric tensor" as function of the constant magnetic field are investigated.

705 Solid-State Light Amplifiers. B. Kazan and F. H. Nicoll. *Optical Society of America, Journal*, v. 47, Oct. 1957, p. 887-894.

Problems in the combination of double-layer intensifiers with and without optical feedback.

706 Graphical Analysis of the Temperature Dependence of the Electronic Population in Semiconductors. G. Brouwer. *Philips Research Reports*, v. 12, Oct. 1957, p. 415-422.

The distribution of electrons and holes in semiconductors and its variation with temperature may be derived by means of a graphical approximation. Method is based directly on the electronic reaction equations in the equilibrium.

707* Some Applications of Square-Loop Ferrite Cores to Telecommunication Switching. W. Six and R. A. Koolhof. *Philips Telecommunication Review*, v. 18, Sept. 1957, p. 105-124.

Principles of switching with square-loop ferrite cores and the advantages of their use in combination with transistors. Examples particularly in electronically controlled telephone exchanges and in a memory circuit for the storage of telegraph characters.

708* The Balanced Transistor DC Converter. J. Noordanus. *Philips Telecommunication Review*, v. 18, Sept. 1957, p. 125-136.

The above has a low internal resistance and a fairly flat load characteristic. With available power transistors output powers in the order of 50 to 100 w. can be obtained from a supply voltage of 12 v. A theoretical analysis is presented.

709* Distortion in Tropospheric Scatter Propagation. H. Bremmer. *Philips Telecommunication Review*, v. 18, Sept. 1957, p. 137-154.

Booker and Gordon's theory for tropospheric scatter propagation is extended to transmitter currents I(t) that differ from time-harmonic functions.

710 On the Electronic Conductivity of Crystals of Silver Halides. J. W. Mitchell. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1276-1281.

Crystals grown and annealed in air are dilute solutions of Ag_2O in the silver halide, and have a much greater photoconductive response at room temperature than crystals of the highest purity. The mechanism responsible for the sensitization of the photoconductivity by Ag_2O is discussed.

711 Variation of Mobility With Electric Field in Nondegenerate Semiconductors. Mahendra Singh Sondha. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1266-1271.

712 Piezoresistive Effect in Indium Antimonide. F. P. Burns and A. A. Fleischer. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1281-1282.

Results are consistent with a spherical conduction-band model.

713 Computation of Noise Figure for Quantum-Mechanical Amplifiers. M. W. P. Strandberg. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1483-1484.

An expression is derived in terms of physical quantities describing the electromagnetic structure and the paramagnetic salts—such as gain, circuit *Q*'s, and salt mol. wt. and volume.

714 Evaluation of Transport Integrals for Mixed Scattering and Application to Galvanomagnetic Effect. A. C. Beer, J. A. Armstrong, and I. N. Greenberg. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1506-1513.

The Johnson-Whitesell evaluations of the conductivity integrals for mixed scattering were extended over larger ranges of magnetic field and impurity scattering parameters to allow their application to the high-mobility semiconductors. Values are given for the first thermoelectric integral.

715 Hall Effect in Titanium, Vanadium, Chromium, and Manganese. Simon Foner. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1513-1516.

Measurements at room temperature with fields up to 30 kilo-oersteds. The Hall constant was positive for all of these elements. The effect is extremely small in Ti and apparently sensitive to small amounts of impurities.

716 Energy Distribution of Secondary Electrons From MgO Single Crystals. N. Rey Whetten and A. B. Laponsky. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1521-1524.

The secondary-electron energy distribution from single crystals of MgO was measured. A dependence of energy distribution on primary electron energy is established. The dependence is consistent with a qualitative interpretation based on the path length of the secondaries inside the crystal.

717 Magnetoresistance of Holes in Germanium and Silicon With Warped Energy Surfaces. J. G. Mavroides and Benjamin Lax. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1530-1534.

The series-expansion method was used to obtain expressions for the magnetoconductivity coefficients in the case of warped energy surfaces and low magnetic fields.

718 Intrinsic Electrical Conductivity in Silicon Carbide. J. H. Racette. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1542-1544.

Measurements on *n*-type SiC single crystals.

719 Thermionic Emission From a Planar Tantalum Crystal. Haywood Shelton. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1553-1557.

Two (211) crystals in Ta ribbon are used as emitter and collector in a three-element retarding-potential experiment.

720 Theory of a Three-Level Maser. Ali Javan. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1579-1589.

Mathematical analysis of "Maser" action, the amplification of microwave power by means of stimulated emission of resonant radiation.

721* (Russian.) Pulse Delay Generator With Automatically Changed Delay Time. **Generator zaderzhannykh impul'sov s avtomaticheski izmeniaemym vremenem zaderzhki.** I. F. Kalinkevich and B. A. Mamyrin. *Pribory i Tekhnika Eksperimenta*, 1957, no. 3, May-June, p. 75-80.

Generator which produces two output impulse voltages is described. The first gives periodic impulses of 0.1μ sec. duration at 20 v.; the impulse frequencies are from 20 to 40 c.p.s. The other gives the same voltage but its impulses are delayed. Delay times are checked automatically.

722* (Russian.) Recording Voltammeter for Semiconductor Triodes. **Charakteriograf dlia polyprovodnikovykh triodov.** K. S. Rzhevkin, K. Ia. Senatorov, and Iu. V. Lubentsov. *Pribory i Tekhnika Eksperimenta*, 1957, no. 3, May-June, p. 81-84.

Description of the equipment used for the oscillographic study of point-contact and junction-type triodes.

723 Transistors vs Tubes for Industrial Applications. *Product Engineering*, v. 28, Oct. 28, 1957, p. 52-56.

Size, efficiency, compatibility, and durability of transistors; what they are and how they work; ambient or self-generated heat; ratings and output considerations.

724* On the Electron-Lattice Interaction in Non-Polar Semiconductors. Shigeharu Koshino. *Progress of Theoretical Physics*, v. 18, July 1957, p. 23-32.

The two-phonon process in non-polar semiconductors is discussed and the acoustical mode-scattering mobility is derived from this type of electron-lattice interaction.

725* (Russian.) On the Frequency Properties of Compound Crystal Triodes. **O chastotnykh svoistvakh sostavnykh kristallicheskikh triodov.** A. G. Filippov. *Radiotekhnika*, v. 12, no. 8, Aug. 1957, p. 21-27.

Calculations and experimental data which show peculiarities in the dependence of the coefficient of current amplification of compound crystal triodes in comparison with ordinary triodes.

726* (Russian.) Electromagnetic Waves of Great Amplitude in Ferrite With Varying Magnetizing Field. **Elektromagnitnye volny s bol'shoi amplitudoi v ferrite pri peremennom podmagnichivanii.** Ia. A. Monosov. *Radiotekhnika i Elektronika*, v. 2, no. 8, Aug. 1957, p. 951-959.

Analysis of propagation of electro-magnetic waves of super-high frequency in a ferrite medium magnetized by an alternating magnetic field. Theoretical calculations show that the change in parameters of the medium is directly proportional to the amplitude of the magnetizing field and does not depend on the amplitude of a super-high frequency field.

727* (Russian.) Variational Method of a Waveguide Calculation With Periodic Discontinuities. **Variatsionnyi metod rascheta volnovodov s periodicheskimi neodnorodnostiami. II.** Sh. E. Tsimring. *Radiotekhnika i Elektronika*, v. 2, no. 8, Aug. 1957, p. 969-988.

Formulation and proof of the "alternative rule" for finding the pair of dispersion curves.

728* (Russian.) Lock-In of an Oscillator With an External Amplitude-Modulated Force. **O zakhvatyvanii avtogeneratora amplitudno-modulirovannoi vneshnei siloi.** D. P. Martynenko and R. V. Khokhlov. *Radiotekhnika i Elektronika*, v. 2, no. 8, Aug. 1957, p. 1001-1011.

Laying out of problem and derivation of basic equations for small and large frequency separations. Shows that the synchronization of an oscillator with amplitude-modulated e.m.f. leads to a phase modulation and distortion of the outgoing signal.

729* (Russian.) Nonlinear Theory of a Travelling-Wave Tube. **Nelineinaia teoriia lampy begushchei volny. II.** Numerical Results. **Chislennye rezul'taty.** L. A. Vainshtein. *Radiotekhnika i Elektronika*, v. 2, no. 8, Aug. 1957, p. 1027-1047.

Derivation of equation for nonlinear theory of a travelling-wave tube working as an amplifier of monochromatic signals. Study of the process of propagation and growth of electromagnetic field along the tube, and the process of movement and bunching of electrons. Dependence of maximum power of electromagnetic field on various factors.

730* (Russian.) Mutual Synchronization of Reflector Klystrons Without Amplitude or Frequency Discontinuities. **Vzaimnaia sinkhronizatsiia otrazhatel'nykh klistronov bez skachkov amplitudy i chastoty.** V. B. Braginskii, S. D. Gvozdover, A. S. Gorshkov, and I. T. Trofimenko. *Radiotekhnika i Elektronika*, v. 2, no. 8, Aug. 1957, p. 1048-1052 + 1 plate.

Experimental investigation of mutual operation of several reflector klystrons.

731 A Transistorized Horizontal-Deflection System. Hunter C. Goodrich. *RCA Review*, v. 18, Sept. 1957, p. 293-307.

Television receiver system consists of an oscillator, driver, output stage with ultor supply, and phase detector.

732 A Thin-Window Cathode-Ray Tube for High-Speed Printing With "Electrofax". Roger G. Olden. *RCA Review*, v. 18, Sept. 1957, p. 343-350.

Shows that character writing speeds of over 10,000 letters per sec. are possible.

733 Microlock. A Tracking Receiver for Satellite Communications. Henry L. Richter, Jr. *Research & Engineering*, v. 3, Oct. 1957, p. 13-17.

Describes a California radio club's tracking of the Russian satellite.

734 The Use of Choppers in DC Amplification. P. T. McCauley. *Research & Engineering*, v. 3, Oct. 1957, p. 26-30.

735 Generation of an emf in Semiconductors With Non-equilibrium Current Carrier Concentrations. Jan Tauc. *Reviews of Modern Physics*, v. 29, July 1957, p. 308-324.

Survey of fundamental ideas dealing with the physical aspects of the generation of a photo-voltage in the semiconductor.

736 Transistor A. F. Amplifiers. D. D. Jones and R. A. Hilbourne. 152 p. 1957. Philosophical Library, New York. (TK7872.T73 J71t)

Systematically treats the design of p-n-p Ge-type transistor audiofrequency amplifiers; gives circuitry and design details of a versatile range of amplifiers, including those for high fidelity reproduction and public address systems with undistorted outputs up to 20 w.

737* (Russian.) Semiconductors and Their Industrial Application. **Poluprovodniki i ikh tekhnicheskie primeneniia.** A. F. Ioffe. *Vestnik Akademii Nauk SSSR*, v. 27, no. 8, 1957, p. 15-20.

General discussion of development and use of semiconductors in the Soviet Union.

738* Transistor Characteristics and Circuits. Harry C. Likel. *Western Union Technical Review*, v. 11, Oct. 1957, p. 129-138.

A simplified explanation of the characteristics of transistors as used in some of the more common elementary circuits.

739* Improved Vacuum Tube Reliability Through Maintenance. G. B. Woodman. *Western Union Technical Review*, v. 11, Oct. 1957, p. 164-167.

A combination of short term aging and standard electrical tests were found practicable and of value in improving reliability.

740* (German.) A Simple Photoelectric Amplifier. **Ein einfacher lichtelektrischer Verstärker.** H. Oswald and H. Straubel. *Zeitschrift für Angewandte Physik*, v. 9, Sept. 1957, p. 438-442.

Construction of amplifier using CdS cells.

741* (German.) The Electric Conductivity of Lead(II) Oxide With Chromium Oxide Additions. **Über die elektrische Leitfähigkeit von Blei II-Oxyd mit Zusätzen von Chromoxyd.** Horst Grunewald and Werner Neumann. *Zeitschrift für Angewandte Physik*, v. 9, Sept. 1957, p. 447-448.

Effect of Cr_2O_3 content (between 0 and 2.0 mol.%) on the electric conductivity of sintered PbO. Additions of up to 2 mol.% Cr_2O_3 produced no change. The mechanism of hole formation.

742* (Russian.) The Electric Conductivity of Vanadium, Lead, and Copper Oxides. **Elektroprovodimost' okislov vanadiia, svintsa i medi.** O. A. Esin and V. L. Fiazev. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 9, Sept. 1957, p. 1998-2002.

Study of electric conductivities in a wide temperature range, including solid and liquid states; V_2O_5 and CuO in their melted states are semiconductors; PbO is an electrolyte.

743* (Russian.) Modulation of Infra-Red Rays in Germanium at Low Temperatures. **Moduliatsiia infrakrasnykh luchei v germanii pri nizkikh temperaturakh.** Iu. I. Ukhanov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1652-1654.

Investigation of effect of temperature on absorption of infra-red rays in Ge. The introduced absorption drops to 23% at a temperature 293 K and to zero at 100 K. Relationship between temperature change and self-transparency of Ge; problems of electron-hole-migration and electroluminescence. The intensity of electroluminescence does not depend on temperature.

744* (Russian.) Simple Methods of Investigation of the Zone Structure of Some Semiconductor Compounds. **O prostykh metodakh issledovaniia zonnoi struktury nekotorykh polyprovodnikovykh soedinenii.** V. E. Khartsiev. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1713-1722.

Theoretical study to derive simple and general equations describing zone structure.

745* (Russian.) Nernst-Ettinghausen Effect in Mercuric Telluride. **Effekt Nernsta-Ettingsgauzena v telluride rtuti.** I. M. Tsidil'korskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1744-1752.

Investigation of electrical conductivity, Hall effect and Nernst-Ettinghausen effect in mercuric telluride. The temperature dependence of Nernst-Ettinghausen field can be explained by the theory of thermo-magnetic phenomena. The Nernst-Ettinghausen effect can be used to evaluate relationships of mobility of electrons and holes. Qualitative verification of the theory for high magnetic fields at equal concentrations of current carriers.

See also: **3** (cooling systems); **709** (distortion in tropospheric scatter propagation); **1387** (ferromagnetic semiconductors).

ENGINEERING ECONOMICS

746 Spectrum of End-Products Shapes Plastics Outlook. Irving Skeist. *Chemical Week*, v. 81, Oct. 26, 1957, p. 114 + 10 pages.

Current trends and future prospects for production and marketing of various plastics and synthetic resins.

747* (German.) The Mean Capital Requirement for Financing Fixed Assets and Its Dependence on the Chosen Method of Depreciation. **Der mittlere Kapitalbedarf zur Finanzierung des Anlagevermögens und seine Abhängigkeit von der gewählten Abschreibungsmethode.** Hermann Flieger. *Gas- und Wasserfach*, v. 98, Ausgabe Gas, Sept. 13, 1957, p. 929-931.

Depreciation as a means of freeing capital; mathematical bases of depreciation methods.

748* (German.) The Growth of Energy Demand Both With Regard to National Economy and Industrial Management. **Das Wachstum des Energiebedarfs in volkswirtschaftlicher und betriebswirtschaftlicher Sicht.** *Gas- und Wasserfach*, v. 98, Ausgabe Gas, Sept. 13, 1957, p. 934-938.

Surveys probable increase in German needs for energy in the next nine years (1956-1965) and its possible sources.

749 Niobium. The Medium-Rare Metal. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 42A-47A.

Niobium is in economic transition. Relative abundance now depends upon mineral-dressing research.

750 Natural Gas. A Special Report on Its Uses. *Petroleum Refiner*, v. 36, Oct. 1957, p. 99-112.

Competition between fuel and petrochemical demand, factors in liquefaction of natural gas, and ethane recovery are discussed.

751 (Italian.) Report on the Mining Service and Statistics of the Extractive Industries in Italy for 1950. **Relazione sul servizio minerario e statistica delle industrie estrattive in Italia nell'anno 1950.** v. 61. 857 p. 1957. Instituto Poligrafico dello Stato, Rome. (TN79 It1.5r)

Production, consumption, markets, and other statistics of the principal mining industries and quarries. Includes accident records, employment figures, and administrative measures, personnel and districts.

752* (Italian.) Use and Economy of Fuels in Italy. **Utilizzazione ed economia dei combustibili in Italia.** C. Padovani. *Rivista dei Combustibili*, v. 11, July-Aug. 1957, p. 429-465.

Changes in power consumption in Italy over the last 35 yrs. are reviewed. Italy still depends on imported fuels for more than 60% of her over-all power requirements.

753 Make or Buy? *Steel*, v. 141, Oct. 14, 1957, p. 105-112.

Cost factors for deciding whether to manufacture or purchase a given article.

754* Yearbook of International Trade Statistics, 1955. 720 p. 1956. United Nations, New York. (HF91 Un2.7y Ref.)

Presents data for 104 countries in tabular form. Data is incomplete for USSR and its satellites.

See also: **63** (wood resources); **818** (Cu ore resources).

FLUID MECHANICS

755 Nonlinear Properties of Circular Orifices. George B. Thurston, Logan E. Hargrove, Jr., and Bill D. Cook. *Acoustical Society of America, Journal*, v. 29, Sept. 1957, p. 992-1001.

756 Interaction Between a Turbulent Air Stream and a Moving Water Surface. Thomas J. Hanratty and James M. Engen. *A.I.Ch.E. Journal*, v. 3, Sept. 1957, p. 299-304.

Variables explored were liquid flow rate, gas flow rate, and film height.

757 Nusselt Values for Estimating Turbulent Liquid Metal Heat Transfer in Noncircular Ducts. James P. Hartnett and Thomas F. Irvine, Jr. *A.I.Ch.E. Journal*, v. 3, Sept. 1957, p. 313-317.

758 A Theoretical Analysis of Heat Transfer in Natural Convection and in Boiling. Yan Po Chang. *ASME, Transactions*, v. 79, Oct. 1957, p. 1501-1513.

Shows how the concept of wave motion can be used in giving a new picture of heat-transfer processes.

759 Experimental Studies of Free Convection Heat Transfer in a Vertical Tube With Uniform Wall Heat Flux. J. P. Hartnett and W. E. Welsh. *ASME, Transactions*, v. 79, Oct. 1957, p. 1551-1557.

Results suggest that the uniform wall-temperature results of Martin for other fluids and other length-radius ratios may be utilized to predict the average performance for the uniform heat-flux boundary conditions.

760* (Russian.) A Theory of Gas Flow Through a Porous Body in the Neighborhood of the Knudsen Region. Pseudomolecular Flow. **Teoriia techeniia gaza v poristom tele v okoloknudsenovskoi oblasti. Psevdomolekuliarnyi potok.** B. V. Deriagin and S. P. Bakanov. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 267-270.

Mathematical analysis.

761 Stable Hot-Wire Anemometer for Low Speeds. J. F. Kemp. *Heating, Piping & Air Conditioning*, v. 29, Oct. 1957, p. 137-142.

Performance characteristics, design, and mechanical construction.

762 A Theoretical Investigation of Laminar Separation in Supersonic Flow. G. E. Gadd. *Journal of the Aeronautical Sciences*, v. 24, Oct. 1957, p. 759 + 13 pages.

The effects of Mach and Reynolds numbers, wall temperature, and surface curvature are investigated by an extension of Stratford's method. Two-dimensional flows only are considered; where the surface is curved the generators are perpendicular to the flow.

763 Equipartition of Energy and Local Isotropy in Turbulent Flows. Mahinder S. Uberoi. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1165-1170.

764 Intermolecular Forces and the Activation Energy for Viscous Flow in Liquids. T. H. S. Higgins and C. J. G. Raw. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 623-624.

765* On the Convection of Heat From Cylinders Immersed in a Low-Speed Stream of Incompressible Fluid. S. Tomotika and H. Yosinobu. *Journal of Mathematics and Physics*, v. 36, July 1957, p. 112-120.

Mathematical analysis.

766 Relation of Fourth-Order to Second-Order Moments in Stationary Isotropic Turbulence. Robert H. Kraichnan. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1485-1490.

An investigation is made of the hypothesis that the fourth-order moments of the two-time velocity amplitude distribution in stationary, isotropic, incompressible turbulence are related to second-order moments as in a normal distribution. It is concluded that this hypothesis is inconsistent with the equations of motion, and the inconsistency is exhibited as a gross violation of energy conservation in the inertial range.

767 The Principles of Turbulent Heat Transfer. H. Reichardt. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1408, Sept. 1957, 45 p. (Translated from *Grundlagen des Turbulenten Wärmeüberganges, Archiv f. die gesamte Wärmetechnik*, nos. 6-7, 1951. (TL570 Un3tm)

Relations are derived for calculating heat-transfer coefficients for turbulent and laminar fully developed flow and heat transfer in pipes and channels at constant wall temperature. Nusselt numbers for a round pipe are computed for Prandtl numbers from 0 to 1000 and a Reynolds number of 30,000.

768 Influence of Turbulence on Transfer of Heat From Cylinders. J. Kestin and P. F. Maeder. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4018, Oct. 1957, 78 p. (TL570 Un3t)

769 Experimental Investigation of Transpiration Cooling for a Turbulent Boundary Layer in Subsonic Flow Using Air as a Coolant. William E. Brunk. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4091, Oct. 1957, 35 p. (TL570 Un3t)

Tests were run for both constant coolant-flow rate and constant wall temperature along a flat porous plate. The results, which indicate a definite decrease in wall temperature along the plate with increase in coolant flow, are in qualitative agreement with a theory for transpiration cooling with a turbulent boundary layer.

See also: **204** (turbulent mixing); **206** (flow of steam-water mixture); **207** (flow in square ducts); **215** (flow in packed beds); **845** (flow of liquid rocket fuels).

FOOD TECHNOLOGY

770* Nutritive Value of Irradiated Turkey. I. Growth-Promoting Quality and Biologic Value. Doris Howes Calloway, Edmond R. Cole, and Harry Spector. **II. Vitamin Losses After Irradiation and Cooking.** Miriam Higgins Thomas and Doris Howes Calloway. *American Dietetic Association, Journal*, v. 33, Oct. 1957, p. 1027-1033.

771 The Lipides of Green Peas. A. C. Wagenknecht. *American Oil Chemists' Society, Journal*, v. 34, Oct. 1957, p. 509-513.

The composition of the various fractions of pea lipides was studied by measuring the N, P, glycerol, fatty acid, and sugar contents, also by means of paper chromatography following acid hydrolysis.

772* (English.) **Gamma Radiation From Some Swedish Foodstuffs.** R. M. Sievert, S. Gustafsson, and C. G. Rylander. *Arkiv för Fysik*, v. 12, no. 5, 1957, p. 481-489.

In every case a significant increase has been observed which seems to originate from fallout from atomic bomb tests.

773 The Effect of Radiation Processing Upon the *in vitro* Digestibility and Nutritional Quality of Proteins. A. Leonard Sheffner, Richard Adachi, and Harry Spector. *Food Research*, v. 22, Sept.-Oct. 1957, p. 455-461.

Irradiation produced no significant destruction of essential amino acids in milk, turkey, or beef protein, and only a small loss of cystine in pork. Thermal processing caused significant decreases in the digestibility of the proteins studied.

774 A Micro-Method and Apparatus for the Determination of Rates of Destruction of Bacterial Spores Subjected to Heat and Bactericidal Agents. Curtis J. Wilder and Harold C. Nordan. *Food Research*, v. 22, Sept.-Oct. 1957, p. 462-467.

775 The Destruction of Thiamine in Meats and in Aqueous Solution by Gamma Radiation. H. S. Groninger and A. L. Tappel. *Food Research*, v. 22, Sept.-Oct. 1957, p. 519-523.

Irradiated aqueous thiamine solution is yellow-colored, fluorescent and has an odor like that of burned rubber or thiazole. There is a formation of ammonia and titratable acid and a destruction of pyrimidine ring. The two main degradation products formed during irradiation are as yet uncharacterized.

776* Effect of Glucose Removal on Storage Stability of Egg Yolk Solids. Pauline Paul, Helen Symonds, Aileen Varozza, and George F. Stewart. *Food Technology*, v. 11, Oct. 1957, p. 494-498.

Enzyme treatment improved storage stability of the solids at 95 F; lower fat content and decreased palatability of doughnuts prepared with the untreated yolks was observed as the storage time increased.

777* Fractionation of Wood Smoke and the Comparison of Chemical Composition of Sawdust and Friction Smokes. Saeed A. Husaini and G. E. Cooper. *Food Technology*, v. 11, Oct. 1957, p. 499-502.

Friction smoke contained less moisture, four times more steam volatile acids and eight times more steam volatile aldehydes and ketones than sawdust smoke. The nonsteam volatile portions of either type smoke is very undesirable for smoking of bacon.

778* Stability of Frozen Concentrated Orange Juice. IV. Effect of Heat Treatment on Hamlin, Pineapple, and Valencia Juices at Different Stages of Maturity. O. W. Bissett, M. K. Veldhuis, R. B. Guyer, and W. M. Miller. *Food Technology*, v. 11, Oct. 1957, p. 512-519.

Heat treatments at 150 and 160 F inactivated a lesser percentage of the enzyme with advancing maturity. Cloud stability was greatest in both heated and unheated juices of the Valencia variety and least in that of the Hamlin.

779* Factors Affecting Quality of Prepackaged Meat. II. Color Studies. Effect of Package Characteristics Upon Color of Product. John A. Rikert, C. Olin Ball, and Elizabeth F. Stier. *Food Technology*, v. 11, Oct. 1957, p. 520-525.

Cellophane-acetate-pliofilm laminate was best packaging material for maintaining good color in cut and in ground samples of lamb; vinylidene copolymer was the best for lean ground beef and cellulose acetate for fat ground beef; cellophane-pliofilm laminate was best for ground lean and fat pork.

780* Vitamin K_5 as a Preservative for Wine. J. N. Casper and H. Y. Yang. *Food Technology*, v. 11, Oct. 1957, p. 536-540.

Vitamin K_5 was not as effective in controlling the development of volatile acids as it was in controlling secondary fermentation. Concentrations as high as 50 p.p.m. did not completely stop the development of volatile acids.

781 Effect of Ionizing Radiations on Fatty Acid Esters. J. R. Chipault, O. S. Privett, G. R. Mizuno, E. Christense Nickell, and W. O. Lundberg. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1713-1720.

Irradiating with β or γ-rays produced peroxides and carbonyl compounds and resulted in odor and flavor changes which did not correlate well with chemical changes. Polymers were formed when unsaturated fats were irradiated in the solid state.

782 Safety of Adipic Acid as Compared With Citric and Tartaric Acid. Henry J. Horn, Emily G. Holland, and Lloyd W. Hazleton. *Journal of Agricultural and Food Chemistry*, v. 5, Oct. 1957, p. 759-761.

Acute and chronic administration to laboratory animals showed that adipic acid is comparable to the above acids and is a safe food additive.

783 Enzymatic Browning, Reflectance Measurements, and Effect of Adenosine Triphosphate on Color Changes Induced in Plant Slices by Polyphenol Oxidase. Rachel U. Makower and Sigmund Schwimmer. *Journal of Agricultural and Food Chemistry*, v. 5, Oct. 1957, p. 768-773.

Studies on prevention of enzymatic color formation were made directly on plant slices by color difference measurements. Color development was studied in potatoes, apples, avocados, mushrooms, and peaches.

784 Heat Transfer in the Food Industry. R. G. Tischer and H. Hurwicz. *Mechanical Engineering*, v. 79, Oct. 1957, p. 922-924.

Use of heat in food-processing operations; heat transfer in canning.

See also: **48** (food from fungi); **78** (amino acid requirements of adults); **117** (vegetable spoilage).

FUELS AND COMBUSTION

785 Quinone Character of Oxidation Products of a Bituminous Coal. C. R. Kinney and D. L. Love. *Analytical Chemistry*, v. 29, Nov. 1957, p. 1641-1645.

Oxidized bituminous coal humic acids may be analyzed by their reduction waves at the dropping Hg electrode. Waves are obtained which are almost certainly due to the reduction of quinone structures.

786 Servomechanisms in Combustion. III. John S. Tyndall. *Combustion*, v. 29, Sept. 1957, p. 51-58.

Advantages and limitations of air as a control fluid in a servomechanism; transmission factors associated with pneumatic signals; typical oil-operated and air-operated servomechanisms for controlling the heavy damper of a boiler stack; design problems for air-operated power units.

787* (German.) The Hydration of Coal in Pyridine at 300° C. **Kohlenhydrierung in Pyridin bei 300° C.** Jan Andries Meys, Hein Israel Waterman, and Dirk Willem van Krevelen. *Erdöl und Kohle*, v. 10, Aug. 1957, p. 500-503.

Determination of the effect of catalyst content and pyridine-coal ratio on the extraction output after hydrating for 15 hr. at 300 C in the presence of a copper oxide-chromic oxide catalyst.

788 Oxygen and Hydrogen in Coals. R. H. Essenhigh. *Fuel*, v. 36, Oct. 1957, p. 395-402.

Equations relating C with O and H percentages were derived.

789 Mechanism of Oxidation of Coal With Special Reference to the Products of Oxidation. P. N. Mukherjee, J. N. Bhowmik, and A. Lahiri. *Fuel*, v. 36, Oct. 1957, p. 417-422.

Coals were oxidized for different periods and the properties of the alkali-soluble as well as alkali-insoluble fractions were studied as regards their elemental composition, exchange capacity, distribution of — COOH and — OH groups, and molecular weight.

790* (Russian.) Gasification of Carbon With Steam in the Presence of Catalysts. **Gazifikatsiia ugleroda vodianym parom v prisutstvii katalizatorov.** V. I. Kislykh and N. V. Shishakov. *Gazovaia Promyshlennost'*, 1957, no. 10, Oct., p. 7-11.

A method is developed to introduce a vaporized catalyst into the process along with the steam.

791 Pre-Ignition and Ignition Reactions of the System Barium Peroxide-Magnesium-Calcium Resinate. Virginia D. Hogan and Saul Gordon. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1401-1405.

The chemical reactions involved in the thermal ignition of the propagatively burning system 81% barium peroxide-17% magnesium-2% calcium resinate were studied by the techniques of thermogravimetry, differential thermal analysis, and determinations of the time to ignition as a function of temperature.

792* (Czech.) Laboratory Investigation of the Process of Combustion in a Powdered Fuel Bed. **Laboratorní výzkum pochodu hoření ve vrstvě prachových paliv.** J. Novák. *Práce Ústavu pro Výzkum a Využití Paliv*, v. 9, nos. 27-29, 1957, p. 3-83.

Factors influencing ignition from above and burning through the fuel on the travelling grate; suitable grate bars; mixing proportions for brown coal dust and North Bohemian semi-coke; wetting powdered fuels.

793* (Czech.) Investigation of the Lower Limit of Quality and Grain of Fine-Grained Fuels for Travelling Grates. **Výzkum spodní hranice jakosti a zrnitosti drobných paliv pro pásové rošty.** F. Sünderhauf, J. Beran, and J. Korda. *Práce Ústavu pro Výzkum a Využití Paliv*, v. 9, nos. 27-29, 1957, p. 84-134.

Experiments on burning various kinds of coal dust and inferior fuels.

794* (Italian.) Interchangeability of the Fuel Gases (Natural Gas Family). **Intercambiabilità dei gas combustibili (famiglia del gas naturale).** P. Delbourg and H. Schneck. *Rivista dei Combustibili*, v. 11, July-Aug. 1957, p. 466-492.

The principle methods are explained in detail.

795 (German.) The Stability and Miscibility of Fuel Oils. **Stabilität und Mischbarkeit von Heizölen.** T. M. B. Marshall. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, Sept. 1957, p. 273-279.

Composition and physical structure of fuel oils. Causes and mechanism of instability, the state of peptization of the asphaltenes is a major factor. Techniques used in refining to ensure stability. Use of proprietary additives.

See also: **232** (preparation of methane from natural gas); **269** (analysis of fuel ashes); **291** (determination of Ti in coal ashes); **750** (uses for natural gas); **752** (Italian fuel economy); **841** (methane and propane engine fuels); **843** (antidetonation properties of naphthene hydrocarbons); **971** (corrosion in oil-fired boiler furnace); **1436** (producers gas plant waste disposal).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

796* (English.) **Main Results of Meteorological Research Done in Hungary During the Years 1954-56.** B. Béll. *Acta Technica, Academiae Scientiarum Hungaricae*, v. 18, nos. 1-2, 1957, p. 133-160.

A summary including abstracts of published papers of developments in climatology, solar radiation research, agricultural meteorology, synoptics, weather forecasting, aerology, and ionospheric research.

797 Lead-Alpha Ages of Rhode Island Granitic Rocks Compared to Their Geologic Ages. Alonzo W. Quinn, Howard W. Jaffe, W. L. Smith, and C. L. Waring. *American Journal of Science*, v. 255, Oct. 1957, p. 547-560.

There are at least three groups of granitic rocks in Rhode Island. The Scituate granite gneiss and the Esmond granite with their affiliates are oldest (Devonian or older), the Cowesett granite and the Quincy granite are intermediate (Mississippian?), and the Westerly granite and the Narragansett Pier granite or so-called redstone are youngest (late or post-Pennsylvanian). Lead-alpha age determinations on zircon and monazite from the three groups gave mean ages of 306±18 MY (million years), 270±7 MY, and 234±23 MY, respectively.

798* A Fast-Response Resistance Thermometer System for Simultaneous Recording of Air Temperatures at a Number of Separated Points. George L. Mason. *American Meteorological Society, Bulletin*, v. 38, Sept. 1957, p. 391-394.

Unbalance current in a Wheatstone bridge network is used as the measure of temperature and is recorded by a multichannel light-beam oscillograph.

799* Incipient Wind-Generation of Ocean Waves by a Norther. Basil W. Wilson. *American Meteorological Society, Bulletin*, v. 38, Sept. 1957, p. 399-404.

Presents observations and photographs of the sea surface in the Gulf of Mexico near Galveston.

800 Apparent Frictional Forces on Clamping Elements as Used in the Oil Industry. E. I. Moser and J. C. Wilhoit, Jr. *ASME, Transactions*, v. 79, Oct. 1957, p. 1627-1636.

801 Oceanographic Information for Engineering Submarine Cable Systems. C. H. Elmendorf and Bruce C. Heezen. *Bell System Technical Journal*, v. 36, Sept. 1957, p. 1047-1093.

Summary of existing data on topography, nature of the sea bottom, temperatures, and catastrophic changes in the ocean bottom; application to cable systems.

802 Meteor Signal Rates Observed in Forward-Scatter. E. L. Vogan and L. L. Campbell. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1176-1189.

Diurnal and seasonal variations in meteor signal rate observed during a 15 month period over a forward-scatter path situated in eastern Canada are discussed. Measurements were made at a frequency of 49.98 Mc. per sec. The data show a large spread from hour to hour and day to day with the greatest signal rate being observed during the summer months.

803* Radioactive Mineral Occurrences in the Guffey Area, Park and Fremont Counties, Colorado. E. Wm. Heinrich and James E. Bever. *Colorado School of Mines, Quarterly*, v. 52, Oct. 1957, p. 23-35.

Newly discovered deposits are of two types: pegmatites containing euxenite, monazite, allanite, uranothorite, radioactive columbite, and radioactive ilmenite; autunite disseminations in Tertiary gravel remnants underlying tuffs.

804 German Boring Units Speed Raising. *Engineering and Mining Journal*, v. 158, Oct. 1957, p. 100-102.

Three types of shaft boring equipment are discussed which were used to bore through hard sedimentary and softer rocks deposits. This equipment was instrumental in saving many miners trapped by cave-ins.

805 Orbital Behavior of Earth Satellites. II. Robert E. Roberson. *Franklin Institute, Journal*, v. 264, Oct. 1957, p. 269-285.

806* (English.) **Report of the Mauna Loa Expedition in the Winter of 1956-57.** Ukichiro Nakaya, Juji Sugaya, and Mikio Shoda. *Hokkaidô University, Faculty of Science, Journal*, v. 5, ser. 2, Mar. 1957, p. 1-34 + 7 plates.

Reports the behavior of snow crystals in this undisturbed area. Effects of condensation nuclei such as aerosol particles.

807* (English.) **Supercooling of Water Droplets.** Motoi Kumai and Kazuhiko Itagaki. *Hokkaidô University, Faculty of Science, Journal*, v. 5, ser. 2, Mar. 1957, p. 42-47.

808* Phosphorus Cycle in the Sea With Particular Reference to Tropical Inshore Waters. R. Jayaraman and G. Seshappa. *Indian Academy of Sciences, Proceedings*, v. 46, sec. B, Aug. 1957, p. 110-125.

Data on total P content of waters along the Indian coast show that values for total P are generally more than 3 times, and sometimes nearly 40 times, the values given by Harvey for the waters of Western English Channel.

809 The Electrification of Precipitation and Thunderstorms. Ross Gunn. *I.R.E., Proceedings*, v. 45, Oct. 1957, p. 1331-1358.

Cosmic rays and radioactivity, sometimes supplemented by corona and photoionization, produce ion pairs in the atmosphere which are transferred to cloud droplets.

810 Flare Measurements From Rockets. T. A. Chubb, H. Friedman, J. E. Kupperian, Jr., and J. C. Lindsay. *Jet Propulsion*, v. 27, Oct. 1957, p. 1094-1097.

The antenna design and the rocket aspect problems, and the vertical trajectory problem in making measurements in the D region of the ionosphere during solar flares.

811* Discussion of the Booker and Cohen Paper "A Theory of Long-Duration Meteor Echoes Based on Atmospheric Turbulence With Experimental Confirmation." L. A. Manning and E. R. Eshleman. *Journal of Geophysical Research*, v. 62, Sept. 1957, p. 367-371.

Concludes that the theory does not accurately represent the properties of meteoric echoes.

812* Lyman Alpha and X-Ray Emissions During a Small Solar Flare. T. A. Chubb, H. Friedman, R. W. Kreplin, and J. E. Kupperian, Jr. *Journal of Geophysical Research*, v. 62, Sept. 1957, p. 389-398.

An unusually high X-ray flux was observed extending to a short wavelength limit of 3 A.

813* Disturbances in the Lower Ionosphere Observed at VHF Following the Solar Flare of 23 February 1956 With Particular Reference to Auroral-Zone Absorption. D. K. Bailey. *Journal of Geophysical Research*, v. 62, Sept. 1957, p. 431-463.

814* Chemical Tests on Mineral Streaks. K. F. G. Hosking. *Mining Magazine*, v. 97, Sept. 1957, p. 139-148.

The use of "chemo-streak-tests" as a rapid aid in mineral identification. Practical details are given for identification of a number of ions.

815 Drillers' Manual on High-Pressure Drilling and Blowout Prevention. Frank S. Bell. *Oil and Gas Journal*, v. 55, Oct. 14, 1957, p. 139-166.

The cost of high-pressure drilling can be cut by preventing blowouts and lost circulation and eliminating unnecessary addition of weight material to the mud.

816* Californians Drilling With Gas. *Petroleum Week*, v. 5, Oct. 4, 1957, p. 22.

Use of natural gas has some advantages over mud for drilling in certain types of formations.

817 Study of Geomagnetic Cutoff Energies and Temporal Variation of the Primary Cosmic Radiation. Frank B. McDonald. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1386-1395.

Results of six Skyhook balloon flights with combination Cerenkov scintillation detectors to study spectral cutoffs as a function of latitude and to observe some aspects of temporal variations at high altitude of the α particles of the primary cosmic radiation.

818 The Porphyry Coppers in 1956. A. B. Parsons. 270 p. 1957. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TN440 P25p)

History, economics, mining techniques, and production statistics of 19 individual porphyry copper properties in North and South America.

819 Weather Modification and Smog. M. Neiburger. *Science*, v. 126, Oct. 4, 1957, p. 637-645.

The various proposals for modifying the weather in order to eliminate smog are discussed.

820 The Use of a Nonionic Detergent and Citric Acid for Improving Cleanout Procedures of Water-Input Wells in Secondary Oil-Recovery Projects. R. T. Johansen, J. P.

Powell, and H. N. Dunning. *U. S. Bureau of Mines, Information Circular* 7797, Aug. 1957, 18 p. (TN21 Un3i)

821* (Russian.) Rockets and Artificial Satellites in Studies of the Upper Atmosphere. **Rakety i iskusstvennye sputniki zemli v issledovaniiakh verkhnei atmosfery.** E. K. Fedorov and G. A. Skuridin. *Vestnik Akademii Nauk SSSR*, v. 27, no. 8, Aug. 1957, p. 37-48.

Survey of work done in the U.S.A. and Soviet Union in studying the upper atmosphere, and use of rockets in these studies. Description of several possible types of future artificial satellites.

See also: **751** (Italian mining statistics); **761** (hot-wire anemometer); **1223** (uranium ores); **1398** (biological attack on marine cables).

GRAPHIC ARTS

822* (German.) The Scientific Motion Picture. **Der wissenschaftliche Film.** Gotthard Wolf. *Naturwissenschaften*, v. 44, no. 18, Sept. 1957, p. 477-482.

The motion picture as a research tool and demonstration aid. Possibilities, requirements, and problems.

823 Offset Platemaking, Surface. Robert F. Reed. 177 p. 1957. Lithographic Technical Foundation, Inc., New York. (NE2425 L71os)

An elementary text for beginners in offset platemaking, covering best methods of making surface plates on Zn and Al.

824* Tinting Trouble? Charles H. Borcher. *Pacific Printer, Publisher and Lithographer*, v. 97, Sept. 1957, p. 10 + 1 page.

Ways to overcome tinting trouble in lithography.

825 Metrical Photography. Gomer T. McNeil. *Photogrammetric Engineering*, v. 23, Sept. 1957, p. 667-677.

A brief history of the heritage of perspective from the primitive age to the advent of the camera; perspective from the viewpoint of the artist and the engineer; other aspects of metrical photography.

826 A Do-It-Yourself Terrain Model. August E. Battisfore. *Photogrammetric Engineering*, v. 23, Sept. 1957, p. 713-716.

Methods for construction of an inexpensive but practical map relief model.

827* (Russian.) High-Speed Printing Installation and Its Calculation. **Bystrodeistvuiushchee pechataiushchee ustroistvo i ego raschet.** *Priborostroenie*, 1957, no. 8, Aug., p. 5-7.

Experiments with a new type of printing press having continuously rotating printing wheels, and its theoretical calculation. Technical speed of this installation can be brought to 20-25 lines per sec. (10-15 printed symbols in one line). Working principles and basic data of the installation.

828* Light Optics Images and the Printer. I. B. R. Halpern. *Printing Equipment Engineer*, v. 88, Oct. 1957, p. 42-46.

An understanding of what light is, how to control it, and what it can do is essential to improving the quality and productivity of printing. (To be continued.)

829* Properties and Processing of Presensitized Offset Printing Plates. V. Plate Qualities Defined. Axel Lundbye. *Printing Equipment Engineer*, v. 88, Oct. 1957, p. 50 + 2 pages.

830* New Information on Tinting. Charles H. Borchers. *Printing Equipment Engineer*, v. 88, Oct. 1957, p. 51 + 2 pages.

Use of materials whose surface activity can be depressed by the acid fountain solution reduce tinting problems. Fairly good correlation has been established between tinting and the ability of paper coatings to lower surface tension.

831 An Image-Converter Tube for High-Speed Photographic Shutter Service. R. G. Stoudenheimer and J. C. Moor. *RCA Review*, v. 18, Sept. 1957, p. 322-331.

Intended for multiple-frame photography of high-speed events as short as ten millimicroseconds.

832* (Russian.) Effect of Quality of Cellulose Triacetate on Physico-Mechanical Properties of the Photographic Film. **Vlianie kachestva triatsetata tselliulozy na fiziko-mekhanicheskie svoistva plenok.** E. K. Podgorodetskii and N. P. Zakurdaeva. *Tekhnika Kino i Televideniia*, 1957, no. 8, Aug., p. 38-42.

Investigation of degree of polymerization and polydispersion of industrial samples of partially hydrolyzed cellulose triacetate. Effect of degree of polymerization of cellulose triacetate on viscosity of its diluted and concentrated solutions and on physico-mechanical properties of films made from cellulose triacetate.

HEAT POWER

833* Electric Ignition for Conductive Fuels. S. J. Sheheen. *Applications and Industry*, 1957, no. 32, Sept., p. 233-236.

Design of an ignition system consisting of a low-impedance source and a shunt-gap plug with auxiliary electrodes adapted to the ignition of jet fuels having high or variable conductivity.

834 Design of Supersonic Expansion Nozzles and Calculation of Isentropic Exponent for Chemically Reacting Gases. R. Edse. *ASME, Transactions*, v. 79, Oct. 1957, p. 1527-1535.

The isentropic exponent of a chemically reacting gas mixture differs greatly from the ratio of the specific heats.

835 Pressure Drop and Air-Flow Distribution in Gas-Turbine Combustors. J. S. Grobman, R. T. Dittrich, and C. C. Graves. *ASME, Transactions*, v. 79, Oct. 1957, p. 1601-1607.

Theoretical calculations gave data for various geometric configurations and operating conditions. Results pertain to tubular turbojet combustor having constant annulers and liner cross sectional areas along the combustor axis, and flush circular holes in the liner walls.

836* (Russian.) The Use of Radioactive Isotopes to Measure the Pressure of Saturated Steam. **Ispol'zovanie radioaktivnykh izotopov dlia opredeleniia davleniia nasyshchennogo para.** An. N. Nesmeianov. *Atomnaia Energiia*, v. 3, no. 9, Sept. 1957, p. 227-237.

Survey of methods and equipment.

837* The Development of Turbo-Charging on the Diesel Engine. N. R. Sheridan. *Australasian Engineer*, v. 50, Sept. 1957, p. 55-61.

838 Ultraenergy Propellents. The Step Beyond High-Energy Propulsion. *Chemical Week*, v. 81, Oct. 12, 1957, p. 148-156.

Ultraenergy fuels promise to exceed performance of boron-based high-energy fuels; should have resounding impact on chemical technology for years to come.

839 Conference of the Oil and Gas Power Division, ASME, Proceedings, 1954-1955. Sections individually paged. (TN863 Oi5p Vis.)

Conference papers and discussions deal largely with recent developments in engines and fuels.

840* Wave Action in Diffusers for Exhaust-Pipe Systems, With Special Reference to the Scavenging of Two-Stroke Engines. F. J. Wallace and G. Boxer. *Institution of Mechanical Engineers, Proceedings*, v. 170, no. 39, 1956, p. 1131-1156.

Describes a theoretical investigation of wave effects in the exhaust system. Concludes that the incorporation of a diffuser in the exhaust system leads to an increase in air flow of up to 85% under favorable conditions.

841* Comparative Studies of Methane and Propane as Engine Fuels. N. P. W. Moore and B. N. Roy. *Institution of Mechanical Engineers, Proceedings*, v. 170, no. 40, 1956, p. 1157-1172.

The performance of a single-cylinder, high-speed, spark-ignition engine has been studied with gaseous methane and propane as fuels. Both are suitable fuels for high-compression-ratio gas engines. The combustion properties of these two simple pure hydrocarbons is also of interest in extending the understanding of the problem of engine knock.

842 A Philosophy for Improved Rocket Nozzle Design. Robert B. Dillaway. *Jet Propulsion*, v. 27, Oct. 1957, p. 1088-1093.

A three-dimensional analysis of supersonic contoured rocket nozzles.

843* (Russian.) Studying the Antidetonation Properties of the Separate Naphthene Hydrocarbons. **Issledovanie antidetonatsionnykh svoistv individual'nykh naftenovykh uglevodorodov.** S. S. Novikov, et al. *Khimiia i Tekhnologiia Topliva, i Masel*, 1957, no. 9, Sept., p. 7-11.

Synthesis and physical-chemical properties of hexamethylene and pentamethylene hydrocarbons, and determination of which has the highest octane number.

844 Nonmetallic Material Compatibility With Liquid Fluorine. Harold G. Price, Jr. and Howard W. Douglass. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E57G18, Oct. 1957, 7 p. (TL782 Un3rm Vis.)

Static tests were made on the compatibility of liquid F with several nonmetallic materials at −320 F and at pressures of 0 and 1500 psi.g. Although environmental effects were not always consistent, reactivity was least with the low-temperature, low-pressure liquid F and greatest with the warm, high-pressure gaseous F.

845 Effect of Fluid System Parameters on Starting Flow in a Liquid Rocket. Richard P. Krebs. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4034, Sept. 1957, 38 p. (TL570 Un3t)

Analysis shows the time rate of change of the main-valve area to have a large effect on the response time of the main flow and on the maximum value of the drop in head between the propellant tank and the suction side of the pump. This suppression head is directly proportional to the length of the suction line, and inversely proportional to the area of the line and the total valve operating time.

See also: **35** (rocket and missile developments); **226** (conditioning boiler feedwater); **551** (gas-turbine performance computers); **757** (liquid metal heat); **821** (rockets for artificial Earth satellite); **954** (corrosion of stainless steel by jet fuels); **1235** (nuclear power plant); **1250** (nuclear power for ships).

INFORMATION—PREPARATION AND DISSEMINATION

846 A Minicard System for Documentary Information. J. W. Kuipers, A. W. Tyler, and W. L. Myers. *American Documentation*, v. 8, Oct. 1957, p. 246-268.

Discusses some aspects of the organization and searching of a file of minicards.

847 System for Indexing Research Reports Using a Punched Card Machine. Eleanor B. Edge, Norman G. Fisher, and Lucy A. Bannister. *American Documentation*, v. 8, Oct. 1957, p. 275-283.

Present frame work is expected to be adaptable to most types of information occurring in the reports being indexed.

848* Russian Is Turned Into English by Electronic Translator. W. Schweisheimer. *Australasian Engineer*, v. 50, Sept. 1957, p. 112 + 2 pages.

Describes this application of the IBM 701 computer.

849 A Statistical Approach to Mechanized Encoding and Searching of Literary Information. H. P. Luhn. *IBM, Journal of Research and Development*, v. 1, Oct. 1957, p. 309-317.

The salient contribution of the system described lies in its realization of a completely automatic encoding of documents for future information retrieval.

850 The Formalization of Scientific Languages. I. The Work of Woodger and Hull. B. Dunham. *IBM, Journal of Research and Development*, v. 1, Oct. 1957, p. 341-348.

The axiomatic attempts of Woodger in genetics and of Hull in the theory of rote learning are examined. (To be continued.)

851 What's in the Literature? Frank T. Sisco. *Metal Progress*, v. 72, Oct. 1957, p. 122-124.

Needs, present work, and future prospects for machine searching of metallurgical literature in the field of metals engineering.

852 Sources of Translations of Aeronautical Interest in NATO Countries. L. J. H. Haylor and R. A. Kennedy. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 56, Aug. 1956, 60 p. (TL565 Ag11r Contin.)

Information on government departments, industrial research organizations, universities, professional institutions, and private organizations making and/or indexing translations.

853* Making Effective Use of Technical Information. Martin S. Peterson. *Package Engineering*, v. 2, Oct. 1957, p. 27 + 5 pages.

How to go about the information-getting process, how to organize it, and some helpful suggestions on its application.

854 Machine Translation of Languages. I. K. Belskaja. *Research*, v. 10, Oct. 1957, p. 383-389.

Some of the recent achievements of the machine translation research group of the U.S.S.R. Academy of Sciences.

855 Finding Chemical Records by Digital Computers. Louis C. Ray and Russell A. Kirsch. *Science*, v. 126, Oct. 25, 1957, p. 814-819.

Some theoretical ideas on the use of automatic data-processing systems for literature searching; the ideas resulted from experiments in searching through chemical information.

856 Machines and Systems for the Modern Library. I. A. Warheit. *Special Libraries*, v. 48, Oct. 1957, p. 357-363.

Factors changing librarianship; document and index storage possibilities; cataloging with machines; human frailties inherent in searching systems; systems which can manipulate entries.

INSTRUMENTATION

857 Measurement and Integration of Acceleration in Inertial Navigation. J. M. Slater. *ASME, Transactions*, v. 79, Oct. 1957, p. 1571-1576.

Outlines the principles of such measurements and some typical approaches to instrumentation.

858* The Role of Gamma-Ray Level Detection Systems in Chemical Plant Instrumentation. E. W. Jones. *British Institution of Radio Engineers, Journal*, v. 17, Sept. 1957, p. 473-479.

Gamma-ray instruments can operate entirely from outside the vessel, are admirably suited to on/off control at a fixed level or continuous indication over a range less than 3-ft. Radiation safety aspects; a typical installation for a glass melting furnace.

859 The Optical Density and Thickness of Evaporated Carbon Films. Anna Cosslett and V. E. Cosslett. *British Journal of Applied Physics*, v. 8, Sept. 1957, p. 374-376.

Measurements for use in electron microscopy.

860 A Method of Measuring the Thermal Constants of Granular Materials. T. S. E. Thomas. *British Journal of Applied Physics*, v. 8, Oct. 1957, p. 403-405.

Thermal constants are determined by measuring the temperature changes at the center and surface of a metal cylinder containing the material. Heat is supplied to the cylinder wall at a constant rate by a resistance winding, and surface heat loss is eliminated by an outer screening tube kept at the same temperature by manual or automatic control.

861 Measurement and Control of Liquid Level by Thermistors. A. B. Soble. *Chemical Engineering Progress*, v. 53, Sept. 1957, p. 444-446.

Ceramic electrical resistors may be used to control or measure level of liquid in a tank or, as an alternative to measurement, they can detect safe, unsafe, and threshold regions. Fundamental operating principle is change in resistance caused by cooling on immersion.

862* A Modified Spencer Microtome for Thin Sectioning. Marie Ussing Nylen and J. W. Holland, Jr. *Experimental Cell Research*, v. 13, Aug. 1957, p. 88-95.

In modified instrument the feed and drive mechanisms interact so that the object clamp, which holds the thermal advance unit, is automatically retracted on the return stroke and brought back to its original position at the beginning of the cutting stroke; consequently damage to the knife and the specimen are avoided.

863* Galvanic Oxygen Recorder. II. P. Hersch. *Instrument Practice*, v. 11, Sept. 1957, p. 937-941.

Systems of the type gas/partly immersed cathode/electrolyte/base metal anode permit O to be determined continuously and with great ease and high sensitivity.

864* (Russian.) Effect of Plastic Deformation on Thermoelectromotive Force of the PtRh-Platinum Thermocouple. **O vliianii plasticheskikh deformatsii na t.e.d.s. platinorodii-platinovoi termopary.** B. K. Bragin. *Izmeritel'naia Teknika*, 1957, no. 5, Sept.-Oct., p. 32-35.

Plastic deformation makes Pt thermoelectrically positive, and the PtRh, negative. As a result, the thermoelectromotive force of the thermocouple decreases.

865* (Russian.) The Materials Needed in Planning a Controlling Pyrometrical Laboratory. **Materialy k proektirovaniiu poverochnoi pirometricheskoi laboratorii.** A. F. Gusakov. *Izmeritel'naia Teknika*, 1957, no. 5, Sept.-Oct., p. 39-42.

List of necessary instruments and equipment; site and construction of a laboratory.

866 Characteristics of the Bayard-Alpert Ionization Gauge at Pressures Above 10^{-5} mm Hg. G. J. Schulz. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1149-1152.

Gages were calibrated in the range from 10^{-5} to about 10^{-1} mm. Hg for Ar, He, Ne, H_2, N_2, and SF_6 gases. The gage becomes insensitive to pressure when the ion current reaches 20 to 30% of the electron current.

867 Counter Diffractometer—The Effect of Vertical Divergence on the Displacement and Breadth of Powder Diffraction Lines. E. R. Pike. *Journal of Scientific Instruments*, v. 34, Sept. 1957, p. 355-363.

868* A New Surface Finish Interference Microscope. *Microscope*, v. 11, July-Aug. 1957, p. 163-170.

Construction and operation; optical system; measurements.

869 Calibration of Shock and Vibration Pickups. Walter Ramberg. *Noise Control*, v. 3, Sept. 1957, p. 23-33.

Reviews several methods which are available for the precise calibration of shock and vibration pickups.

870* The Use of Gamma Radiation for Density Measurement. Philip E. Ohmart. *Nondestructive Testing*, v. 15, Sept.-Oct. 1957, p. 270-273.

Description and applications of radioactivity density gages.

871* (Czech.) The Measurement of Particle Size Below 0.06 mm. **Měření velikosti částic pod 0.06 mm. II.** Sedimentation Methods. **Methody sedimentační.** V. Večeříková, F. Bareš, and Vl. Charvát. *Práce Ústavu pro Výzkum a Využití Paliv*, v. 8, nos. 17-26, 1957, p. 87-109.

872* (Russian.) Apparatus for Detection of Weak Ultraviolet Light. **Pribor dlia signalizatsii poiavleniia slabogo ultravioletovogo sveta.** S. M. Zhdanov, V. M. Makarov, and M. S. Khaikin. *Pribory i Tekhnika Eksperimenta*, 1957, no. 3, May-June, p. 93-96.

Description of apparatus; use, especially for fire prevention purposes.

873 Extended Range Thermal Conductivity Vacuum Gauge. Allen R. Hamilton. *Review of Scientific Instruments*, v. 28, Sept. 1957, p. 693-695.

Circuitry is simple and device contains no perishable components.

874 Ultraviolet Television Color-Translating Microscope. V. K. Zworykin and Fred L. Hatke. *Science*, v. 126, Oct. 25, 1957, p. 805-810.

Microscope adapts color vision to the viewing at high magnification of living cells illuminated by ultra-violet radiation.

875 Automatic Particle and Bacterial Colony Counter. H. P. Mansberg. *Science*, v. 126, Oct. 25, 1957, p. 823-827.

Design, performance, and applications.

876 Glass Electrode for Measuring Sodium Ion. George Eisenman, Donald O. Rudin, and James U. Casby. *Science*, v. 126, Oct. 25, 1957, p. 831-834.

A sodium alumino-silicate glass containing 11 mol.% of Na_2O, 18 mol.% of Al_2O_3, and 71 mol.% of SiO_2 offers electrodes of practical usefulness for selectively measuring the Na ion activity as a continuous function of time in certain ionic mixtures, including extracellular biological fluids.

877 (Czech.) Optical Extensometer for Mechanical Testing of Materials. **Optický průtahoměr pro mechanické zkoušky materiálu.** Vl. Vrzal. *Strojírenství*, v. 7, Aug. 1957, p. 610-614.

Modified Ewing extensometer makes it possible to measure wide areas of deformations.

878 (Czech.) Periodic Measuring and Regulation of the Viscosity of Liquids. **Periodické měření a regulace viskosity kapalin.** B. Cihelka. *Strojírenství*, v. 7, Aug. 1957, p. 622-624.

Automatic regulator for determining viscosity consists of a measuring element, which is built on the principle of the corpuscle viscosimeter, an auxiliary small pump, and a control panel with a differential registering apparatus, visual signalling, and final control elements.

879* (German.) Methods for Measuring Rapidly Changing Temperatures. **Messmethoden schnellveränderlicher Temperaturen.** W. Heinrich and F. Peschke. *Technik*, v. 12, Aug. 1957, p. 532-540.

Temperature calculated from the intensity of spectral lines.

880 A Mass Spectrometer Surface Ionization Source for Use With a Vacuum Lock. Richard E. Sladky. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, Y-1173, Sept. 1957, 13 p. (UF767 Un3.1y Contin.)

A surface ionization source was designed and built to be used with a mass spectrometer equipped with a vacuum lock. The sample filament mounts on a plug which fits into a receptacle mounted on the case plate. Sample plugs are changed without loss of vacuum.

See also: **897** (permeability of rubber-like vacuum shaft seals); **902** (hydraulic fluids); **993** (liquid steel temperature measurement); **1174** (high temperature microscopy); **1471** (abrasion tester).

LUBRICATION AND FRICTION

881* Seals for Roll Neck and Roller Table Bearings. H. N. Wilkinson. *Engineer*, v. 204, Sept. 20, 1957, p. 409-415.

Surveys the various types of seals available, indicating their suitability and the main requirements for efficient operation. The lip seal, the type most widely used, is dealt with in detail.

882* Effect of Inertia on Wide Angle Flow in Hydrodynamic Lubrication. J. F. Osterle and W. F. Hughes. *Engineer*, v. 204, Sept. 27, 1957, p. 449.

For flows in which the slider inclination angle is large the neglect of lubricant inertia can result in serious error.

883* Diagnosis and Analysis of Plain Bearing Failures. P. P. Love. *Institution of Engineers & Shipbuilders in Scotland, Transactions*, v. 100, pt. 7, 1956-1957, p. 647-671.

Failure of a bearing is due to faulty design, manufacture, assembly, or use. Each of these aspects is considered in turn, although they cannot always be entirely separated.

884 Plastic Ball Bearings Compete With Steel. William Czygan. *Iron Age*, v. 180, Oct. 10, 1957, p. 116-117.

Plastic balls are cheaper than steel, light weight, corrosion resistant, resistant to impact and shock, and need no lubrication.

885* Inorganic Microgel Grease Performance in Industrial Applications. J. A. Bell. *Lubrication Engineering*, v. 13, Sept. 1957, p. 490-493.

Evaluation studies show microgel grease is superior to lithium base multipurpose greases in temperature ceiling and effective operational life under both dry and wet conditions.

886 Selecting Friction Materials. I. Selection Factors. Woven, Rubberized and Molded Materials. Elwin J. Salter. *Materials in Design Engineering*, v. 46, Oct. 1957, p. 130-133.

Coefficient of friction, wear, smooth operation, noise, water sensitivity, and cost are important considerations.

887 Bearings, Lubricants, and Lubrication. *Mechanical Engineering*, v. 79, Sept. 1957, p. 842-852.

A digest of 1956 literature covering roller, journal, and thrust bearings; gears; boundary and metalworking lubrication; automotive lubricants; properties of lubricants; miscellaneous books.

888 Wear of Metals. F. T. Barwell. *Metal Industry*, v. 91, Sept. 27, 1957, p. 258 + 1 page.

Scuffing, fretting corrosion, and simple sliding phenomena are discussed.

889 How to Design Ball Bearings for Water Lubrication. Phillip R. Eklund. *Product Engineering*, v. 28, Oct. 28, 1957, p. 72-73.

Bearing materials; mechanical requirements; tips on getting best performance.

890 (French.) Lubricated Friction Under Severe Conditions. **Le frottement lubrifié sous conditions sévères.** J. Pomey. *Revue de l'Institut Français du Pétrole et Annales des Combustibles Liquides*, v. 12, June 1957, p. 754-780.

Thermal calculations. Significance of a critical seizing temperature. The process of previous metal surface chemical treatments, as well as the action of sulfurized or chlorinated products added to the lubricating oil are examined on three grounds: absence of metal relationship, low friction coefficient, and low specific wear. (To be continued.)

See also: **800** (coefficient of friction of serrated surfaces); **962** (bearing corrosion); **1110** (roller bearing manufacture); **1529** (welding by friction).

MECHANICAL ENGINEERING

891* (Russian.) Stability of Shafts With Varying Cross-Sections. **Ustoichivost' sterzhnei peremennogo secheniia.** M. R. Fel'dman. *Akademiia Nauk Armianskoi SSR, Izvestiia*, v. 10, no. 4, 1957, p. 19-28.

Mathematical analysis.

892* Ultimate Shear Strength of Reinforced Concrete Flat Slabs, Footings, Beams, and Frame Members Without Shear Reinforcement. Charles S. Whitney. *American Concrete Institute, Journal*, v. 29, Oct. 1957, p. 265-298; *ACI Proceedings*, v. 54, 1957, p. 265-298.

893 Vibration Design Charts. J. N. MacDuff and R. P. Felgar. *ASME, Transactions*, v. 79, Oct. 1957, p. 1459-1475.

Charts, tables, and nomographs provide a quick procedure for estimating natural frequencies of uniform and nonuniform beams and uniform plates.

894 Two Applications of a Digital Computer to Machine-Design Problems. Joseph T. Lester, Jr. *ASME, Transactions*, v. 79, Oct. 1957, p. 1476-1482.

Tedious table-making computations and solution of complex differential equations are examples.

895* Application of Research to Pressure-Vessel Design. P. H. R. Lane. *British Chemical Engineering*, v. 2, Oct. 1957, p. 552-557.

How the results of investigations into strength and stress distributions in pressure vessels can be applied to improving their design.

896 *British Engine, Boiler & Electrical Insurance Co. Ltd., Technical Report, New ser.*, v. 3, 222 p. (TJ1 B77 Contin.)

Reports experiences with corrosion and mechanical defects in boilers, pressure vessels, engines, turbines, compressors, pumps, electrical machinery, gasholders, lifts, and cranes.

897 High Vacuum Shaft Seals, Flanged Joints, and the Gassing and the Permeability of Rubber-Like Materials. R. H. V. M. Dawton. *British Journal of Applied Physics*, v. 8, Oct. 1957, p. 414-421.

Results of some high vacuum measurements such as gassing rates and permeability rates, on shaft seals and flanged joints; effect of rubber-like materials when used on continuously pumped high vacuum equipment.

898* The Motion of a Ship, as a Floating Rigid Body, in a Seaway. A. S. Peters and J. J. Stoker. *Communications on Pure and Applied Mathematics*, v. 10, Aug. 1957, p. 399-490.

Development of a mathematical theory for the motion of a ship, to be treated as a freely floating rigid body under the action of given external forces.

899 Designing for Production. Edward N. Baldwin and Benjamin W. Niebel. 645 p. 1957. Richard D. Irwin, Inc., Homewood, Ill. (TS149 B19d)

Covers the major engineering materials including ferrous, nonferrous, plastics, rubber, and synthetic rubber, and the principal manufacturing processes, including metal forming and shaping, metal cutting, joining and finishing processes, and packaging.

900 Precision Compression and Extension Spring Design. O. G. Meyers and S. L. Albright. *Electromechanical Design*, v. 1, Sept.-Oct. 1957, p. 88-95.

A simplified but complete design procedure for precision round-wire, helical compression springs.

901* Problems of Combined Creep and Fatigue Design. A. J. Kennedy. *Engineer*, v. 204, Sept. 27, 1957, p. 444-447.

Reviews the evidence relating to interaction between the two processes of deformation and fatigue, particular attention being given to the case where the deformation occurs by creep.

902 Fire Resistant Hydraulic Fluids for Near-Furnace Systems Safeguard Life and Property at No Loss in Efficiency. C. R. Schmitt. *Industrial Heating*, v. 24, Sept. 1957, p. 1756 + 6 pages.

903* Plastic Bending of an Annular Plate. P. G. Hodge, Jr. *Journal of Mathematics and Physics*, v. 36, July 1957, p. 130-137.

Mathematical analysis.

904 How to Design High-Speed Rotating Parts for Maximum "Burst-Resistance". R. G. Anderson. *Machine Design*, v. 29, Oct. 17, 1957, p. 148-156.

The nature of centrifugal loading; influence of stress, strength, and ductility upon bursting speed.

905* Spring Design. XXX. W. R. Berry. *Mechanical World and Engineering Record*, v. 137, Oct. 1957, p. 466-470.

The improvement of spring life by shot peening and methods of providing for it in design.

906 Testing of Welded Aluminum Hopper Cars. J. F. Whiting. *Metal Progress*, v. 72, Oct. 1957, p. 125-128.

Stresses were measured by strain gages on full-sized hopper cars during static, shake-out, and impact tests simulating actual service conditions.

907* Durability Performance of Flexible Packages. Florren E. Long. *Package Engineering*, v. 2, Oct. 1957, p. 31 + 4 pages.

Simulated shipping exposure under the merchandising humidity and temperature conditions followed by storage tests under ambient conditions, is a useful tool to assist in predicting durability performance.

908* How German Experts Conduct Packaging Research. R. Heiss and G. Schricker. *Package Engineering*, v. 2, Oct. 1957, p. 43-50.

Reviews activities and sets forth some useful concepts and information about packaging problems in which they are involved.

909* Facts About Pump Packings and Seals. V. Packing Maintenance. Harold Woodhouse. *Pipe Line Industry*, v. 7, Oct. 1957, p. 58-62.

A helpful guide for preventing packing troubles.

910 Proceedings of the Society for Experimental Stress Analysis. C. V. Mahlmann and W. M. Murray, editors. v. XV. 200 p. 1957. Society for Experimental Stress Analysis, Cambridge, Mass. (TG265 Sol3p Vis.)

Includes 18 technical papers on methods and equipment for stress analysis.

911 For Push or Pull—Is Compressed Air Your Answer? Harry L. Stewart and J. M. Moritz. *Product Engineering*, v. 28, Oct. 14, 1957, p. 72-76.

Advantages and limitations of pneumatics for power control devices.

912 How to Construct Charts for Rapid Weight-Strength Analysis of Pressure Vessels. R. E. Wong. *Product Engineering*, v. 28, Oct. 14, 1957, p. 95-98.

Simple weight-volume ratio formulas for cylinders, spheres and elliptical heads speed designing. Included are recommended proof-pressure stresses for eight commonly used materials.

913 How to Measure Principal Stresses. C. C. Perry. *Product Engineering*, v. 28, Oct. 14, 1957, p. 101-105.

Failure theories in stress analysis; distribution patterns for normal stresses, equations relating strain-gage readings, and principal stresses.

914 Look What's Happening to Honeycombs. *Steel*, v. 141, Oct. 14, 1957, p. 116-119.

A progress report on fabrication of various types of sandwich structures.

915* (English.) **General Principles Governing the Choice of Materials.** N. P. Allen. *Teknisk Ukeblad*, v. 104, Sept. 12, 1957, p. 735 + 7 pages.

Availability, formability, physical requirements of the duty, and permanence are important considerations when selecting engineering materials.

916 The Theory of Vibrations for Engineers. E. B. Cole. 3rd Rev. Ed. 362 p. 1957. Macmillan Co., New York. (TA355 C67t3)

Analysis of vibrations in beams, shafts, and engines. It is now possible to predict the likelihood of serious vibrations being set up, and consequently steps can be taken for their prevention, during the design stage of the plant instead of by costly trial-and-error alterations after erection.

917* How to Determine Production Tolerances. I. Complete Interchangeability. Karl H. Moltrecht and Robert M. Caddell. *Tool Engineer*, v. 39, Oct. 1957, p. 81-85.

Describes a scientific method for safely increasing tolerances which requires only a minimum of mathematics. (To be continued.)

918* Tool Engineering for Production of Miniature Parts. Donald E. Zierk. *Tool Engineer*, v. 39, Oct. 1957, p. 86-93.

Important considerations in planning for the manufacture of miniature parts such as in watch manufacture.

919* Research Dynamometer Records Torque at Every Angular Position. Stefan Gorecki. *Tool Engineer*, v. 39, Oct. 1957, p. 107.

Describes a Polish development.

920* Fire-Resistant Hydraulic Fluids Mean Safer Die Casting. H. M. Eversz. *Tool Engineer*, v. 39, Oct. 1957, p. 113-115.

Describes selection of a suitable emulsion type fluid after an experience with a hydraulic oil fire.

921* Modular Construction Cuts Design and Fabrication Costs. T. W. Black. *Tool Engineer*, v. 39, Oct. 1957, p. 119-122.

922 Application of Obliquely Mounted Strain Gage to Measurement of Residual Stresses in Disks. M. H. Hirschberg, R. H. Kemp, and S. S. Manson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4027, Sept. 1957, 18 p. (TL570 Un3t)

Procedure consists of making several preliminary radial saw cuts to reduce the over-all residual stress level and then one final diametral saw cut adjacent to the mounted strain gages through the plane where the residual tangential stress is desired. Residual radial stresses are then calculated from the measured residual tangential stresses.

See also: **1** (stiffness of thin wings); **227** (selection of pumps); **857** (accelerometer design); **1242** (nuclear powered ships); **1395** (design with reinforced plastics); **1424** (Teflon piston rings for compressors).

METALLURGY

923* Metallurgical Applications of Vacuum Technology. K. Diels. *Australasian Engineer*, v. 50, Sept. 1957, p. 72-76. (Reprinted from *Berg-und Hüttenmännische Monatshefte*, v. 100, nos. 7-8, 1955.)

A general review.

924* Nickel Alloys With Special Properties. C. Gordon Smith. *Birmingham Metallurgical Society, Journal*, v. 37, Sept. 1957, p. 553-565.

General review of properties and applications of Fe-Ni alloys, including low-expansion alloys, glass-to-metal seals, magnetic alloys, high permeability alloys, permanent magnets, magnetostrictive alloys, and magnetic compensation alloys.

925* High Strength Nickel-Chromium Alloys for Elevated Temperature Service. K. B. Young. *Canadian Aeronautical Journal*, v. 3, Oct. 1957, p. 287-295.

Alloys for use in the range of 1300 to 1650 F are sought.

926* (German.) The Metallurgy of Titanium. **Zur Metallurgie des Titans.** Paul Ehrlich. *Chemie-Ingenieur-Technik*, v. 29, Sept. 1957, p. 557-562.

Reports the present state of Ti metallurgy.

927 High Tensile Stainless. *Iron and Steel*, v. 30, Oct. 1957, p. 487-488.

FV520 combines the high strength and relatively low thermal expansion of 2S80 with the corrosion resistance of 18/8. It is weldable and is available as forgings, castings, sheet or wire. Sheet components can be formed in the austenitic condition and heat treated at 750 and 550 C to give uniform hardness of 350 Brinell.

928 Alloy Cast Irons Can Solve Tough Problems. *Materials in Design Engineering*, v. 46, Oct. 1957, p. 140-144.

Cast iron containing additions of Ni or Cr, or more Si than usual, are widely used for corrosion resistance, heat resistance, electrical resistance, low thermal expansion, and nonmagnetic properties.

929 Titanium. John L. Everhart. *Materials in Design Engineering*, v. 46, Oct. 1957, p. 149-168.

Manual covers all commercial and semicommercial alloys now in production, and provides up-to-date information on composition and properties, available engineering forms, working characteristics, and current applications in aircraft, corrosion resistant equipment, and electronics.

930* (Dutch.) Survey of the Behavior of Nickel Alloys, Especially Nickel-Chromium Alloys at High Temperatures. **Overzicht over het gedrag van nikkellegeringen, in het bijzonder de nikkel-chroom-legeringn, bij hoge temperatuur.** C. Vollers. *Metalen*, v. 12, Aug. 31, 1957, p. 302-310; Sept. 16, 1957, p. 342-349.

Oxidation resistance and high-temperature corrosion resistance in different gas atmospheres under varying conditions; creep properties; fatigue; influence of notches. New high temperature applications. Weldability.

931 Engineering Research at East Kilbride. R. J. F. Franklin. *Metal Industry*, v. 91, Sept. 27, 1957, p. 265-269.

Review of work in progress at the Mechanical Engineering Research Laboratory at Glasgow, Scotland. Current projects include studies of fatigue cracks, strength of pin-joints, creep under complex stress, and design of extrusion dies.

932 Aluminium for Heating in Tankers. H. M. Walter. *Metal Industry*, v. 91, Sept. 27, 1957, p. 279-282.

Four years of practical experience indicate that aluminum piping can be economically used.

933 Plutonium. W. F. Biddle. *Metal Industry*, v. 91, Oct. 11, 1957, p. 316 + 3 pages.

Properties and potential uses in nuclear power reactors.

934 Progress in Magnesium. H. G. Warrington. *Metal Progress*, v. 72, Oct. 1957, p. 139-142.

Unlimited ore supplies, well-developed reduction and fabrication processes, light weight and other inherent advantages, together with continually improved alloys, foreshadow enlarged consumption.

935* (French.) A Study of Surface Phenomena Caused in Drawing of Open-Hearth and Electric Steels. **Etude des phénomènes superficiels dus à l'étirage des aciers Martin et électriques.** Maurice Vauzelle. *Métaux, Corrosion-Industries*, v. 32, July-Aug. 1957, p. 269-285.

Effects of cold working on machinability, structure, and mechanical properties.

936* Thorium—Its Properties and Characteristics. I. P. Bell. *Nuclear Engineering*, v. 2, Oct. 1957, p. 418-422.

Properties are generally superior to those of U, particularly in its compatibility with reactor structural materials. It shows comparable corrosion in gaseous atmospheres and is highly pyrophoric in finely divided form. It presents a radioactive hazard during melting and fabricating, necessitating special precautions.

937 The Metallurgy of Niobium. M. D. Jepson. *Research*, v. 10, Oct. 1957, p. 390-395.

Extraction; chemical, physical, and mechanical properties; fabrication; alloys.

938* "Mach 4" Stainless for 1000° Service Beats Aircraft Thermal Barrier. *Western Metals*, v. 15, Oct. 1957, p. 62.

Properties and applications of Armco Steel Corporation's new precipitation-hardened stainless steel alloy, designated as PH 15-7 Mo.

See also: **197** (steel plant refractories); **749** (Cb production); **851** (machine searching of metallurgical literature); **914** (fabrication of honeycomb panels); **1256** (atomic fuels); **1268** (Be fuel elements for nuclear reactors); **1444** (dust control in steel industry); **1445** (dust in iron and steel industry).

METALS—CORROSION

939 Corrosion of Massive Magnesium by Organic Free Radical Ions Generated by Unipositive Magnesium. Donald L. Burdick, Angelo V. Santoro, William E. McEwen, and Jacob Kleinberg. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5467-5470.

Evidence that corrosion process takes place by a chain reaction with ketyl radical-ions and +1 Mg serving as chain carriers.

940 Kinetics of the Reaction Between Magnesium and Water Vapor. Dale S. Gibbs and H. J. Svec. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-779, June 1956, 33 p. (UF767 Un3.1is Contin.)

941* (German.) Studies on the Structure and Adhesive Strength of Scale Layers on Unalloyed Steel Plates. **Untersuchungen über den Aufbau und die Haftfestigkeit von Zunderschichten auf Grobblechen aus unlegiertem Stahl.** Hans-Jürgen Engell and Friedrich-Karl Peters. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 567-574.

Formation of roll scales and annealing scales; interrelationship between sealing, adhesive strength, and oxidation kinetics.

942* (German.) Corrosion Problems in Atomic Reactors Caused by Water at High Temperatures (Above 100 C). **Korrosionsprobleme in Atomreaktoren durch Wasser bei höheren Temperaturen. II.** Corrosion Reaction of Materials for Fuel Elements and Their Protective Envelopes. **Korrosionsverhalten der Materialien für die Brennstoffelemente und deren Unhüllungen. III.** Corrosion Properties of Construction Materials Used for Building Reactors. **Korrosionseigenschaften von im Reaktorbau verwendeten Konstruktionsmaterialien.** Williblad Machu. *Atomkernenergie*, v. 2, July 1957, p. 248-255.

Corrosion of Al, Zr, and their alloys used as protective envelopes for U and Th; stainless, heat-resistant, and austenitic steels, Cr, Ni, Co, Ti, Au, Pt Ag, Mg, Cu, and SiC used as construction materials.

943 Effect of Structure of Lead Upon Its Corrosion in Sulfuric Acid. M. A. Dasoyan. *Henry Brutcher Translation No.* 3940, 8 p. (From *Doklady Akademii Nauk SSSR*, v. 107, no. 6, 1956, p. 863-866.) Henry Brutcher, Altadena, Calif.

Investigation of new and more efficient additions to improve the structure and properties of alloys used in lead batteries.

944* (French.) Corrosion by Potable Water. **La corrosion par l'eau potable.** T. Samuel. *Centre Belge d'Etude et de Documentation des Eaux, Bulletin Mensuel*, 1957, nos. 80-81, Aug.-Sept., p. 325-331.

Study of steel test specimens after five months exposure in water systems.

945* (French.) A Contribution to the Study of Aluminum Corrosion in Alkaline Medium. Effect of Concentration. **Contribution à l'étude de la corrosion de l'aluminium en milieu alcalin. Effet de la concentration.** Helmy Makram. *Comptes Rendus*, v. 245, Sept. 23, 1957, p. 1060-1062.

Variation, at constant temperature, of the duration of corrosion of an Al plate as a function of NaOH electrolyte concentration.

946 Telephone Cable Corrosion Problems. W. W. Elley. *Corrosion*, v. 13, Oct. 1957, p. 134 + 2 pages.

Some suggestions for improved methods in making surveys of bare and ducted cables.

947 Artificial Insulating Joints for Stray Current Mitigative Measurements. G. H. Cantwell. *Corrosion*, v. 13, Oct. 1957, p. 616t-618t.

Method can be applied to any structure carrying stray d.c. earth currents.

948 Corrosion of Austenitic Stainless Steels in Sulfuric Acid. E. H. Phelps and D. C. Vreeland. *Corrosion*, v. 13, Oct. 1957, p. 619t-624t.

Six grades of stainless steel were investigated in air and nitrogen saturated H_2SO_4 solutions at 30, 50, and 70 C.

949 Standardization in the Field of Corrosion and Corrosion-Protection in Germany. *Corrosion*, v. 13, Oct. 1957, p. 625t-626t. (Translated from *Metall*, v. 9, July 1955, p. 593.)

Status of German standardization relating to corrosion and corrosion-protection by chemical, electrochemical, or galvanic coatings.

950 Corrosion and Metal Transport in Fused Sodium Hydroxide. II. Corrosion of Nickel-Molybdenum-Iron Alloys. G. Pedro Smith and Eugene E. Hoffmann. *Corrosion*, v. 13, Oct. 1957, p. 627t-630t.

Alloys of Ni, Mo, and Fe, containing at least 70% Ni, showed more resistance to corrosion by NaOH melts at 815 C than any other alloys which have been tested.

951 Sulfide Corrosion Cracking of High Strength Bolting Material. Donald Warren and G. W. Beckman. *Corrosion*, v. 13, Oct. 1957, p. 631t-646t.

Susceptibility to cracking increased with increasing specimen hardness, increasing applied stress, increasing amounts of plastic deformation, and decreasing test temperature.

952 Titanium, Zirconium and Tantalum for Control of Corrosion. William E. Lusby, Jr. *Corrosion*, v. 13, Oct. 1957, p. 654t-658t.

Review of corrosion properties and recent experience indicates an expanding market for Ti and Zr.

953 High Alloys to Combat Corrosion. E. D. Weisert. *Corrosion*, v. 13, Oct. 1957, p. 659t-671t.

Properties of Ni-Mo, Ni-Mo Cr, and Ni-Cr-Mo alloys. Cobalt-base alloys and Si-bearing alloys are also considered.

954 Quantitative Comparison of Surface Finishes and Heat Treatment of Stainless Steel With Respect to Corrosion by Jet Fuels. R. G. Carlson. *Corrosion*, v. 13, Oct. 1957, p. 672t-676t.

955 The Growth of Ferrous Sulfide on Iron. R. A. Meussner and C. E. Birchenall. *Corrosion*, v. 13, Oct. 1957, p. 677t-689t.

Growth rate in S vapor was studied between 650 and 900 C with S vapor pressures between 10 and 500 mm. of Hg.

956 A Laboratory Study of N-Oleoyl Sarcosine as a Rust Inhibitor in Some Petroleum Products. Robert M. Pines and John D. Spivack. *Corrosion*, v. 13, Oct. 1957, p. 690t-694t.

Hydrocarbon solutions are particularly effective in preventing water extraction of the inhibitor.

rusting in the presence of synthetic sea water and in resisting

957* (French.) Electrochemistry and Corrosion. **Électrochimie et Corrosion.** M. Pourbaix. *Corrosion et Anticorrosion*, v. 5, Sept. 1957, p. 230-240.

Fundamental investigations of thermodynamics and electrochemical kinetics applied to corrosion and the protection of metals and alloys. Application to electric cells, batteries, electrolysis, mineral chemistry, metallurgy, and semiconductors.

958 The Relation Between Pitting Corrosion and the Ferrous - Ferric Oxidation - Reduction Kinetics on Passive Surfaces. Milton Stern. *Electrochemical Society, Journal*, v. 104, Oct. 1957, p. 600-606.

Studies on stainless steels, Hastelloy, and Ti. Activation polarization parameters are not markedly different for all the surfaces studied except for Ti where the exchange current is an order of magnitude smaller. The local anodic polarization curve for solution of metal was found to be extremely steep.

959 Optical Measurement of Film Growth on Silicon and Germanium Surfaces in Room Air. R. J. Archer. *Electrochemical Society, Journal*, v. 104, Oct. 1957, p. 619-622.

Thickness and growth kinetics of oxide films on polished Si and Ge exposed to room air after having been rinsed in HF were obtained by measuring the ellipticity of reflected polarized light.

960 Contribution to the Theory of Cathodic Protection. II. Carl Wagner. *Electrochemical Society, Journal*, v. 104, Oct. 1957, p. 631-637.

Conditions are shown under which the differences in the local single electrode potential are sufficiently low so that complete cathodic protection without significant H evolution can be accomplished by using an automatic control of the impressed current.

961 How Zinc Anodes Can Reduce Galvanic Corrosion in Zinc Plant Thickeners. *Engineering and Mining Journal*, v. 158, Oct. 1957, p. 99.

962 Copper-Lead Bearing Corrosion Inhibition in Diesel Service. J. R. Thomas, O. L. Harle, W. L. Richardson, and L. O. Bowman. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1703-1708.

Program was undertaken to develop S-free inhibitors suitable for use with both Cu-Pb and Ag bearings. Corrosive conditions were studied in a GM 3-71 diesel engine.

963 Corrosion Testing—The Villanova Cycling Machine. G. N. Quam, Donald Schwartz, and William Barnhurst. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 85A-86A.

Machine cycles temperature and humidity, giving dew points at an accelerated rate, and produces heating of the specimen while covered with condensed water.

964* **Protective Zinc Anodes.** *Industrial Finishing (London)*, v. 9, Sept. 1957, p. 814-816.

Principles of cathodic protection. Use and advantages of high-purity Zn as an anode in soil and sea.

965 Mechanism of Formation of Metal Particles in Scale on Nickel Steels. K. Sachs. *Iron and Steel Institute, Journal*, v. 187, Oct. 1957, p. 93-104.

The metal particles entangled with the oxide in the inner layer of the scale on Ni steels form by the competitive operation of two mechanisms: the preferential oxidation of Fe leading to the enrichment in Ni of metal entrapped in the advancing scale, and the transient solution of Ni in the wüstite followed by its precipitation on suitable nuclei.

966 Adsorption Studies on Metals. V. Oxygen on Nickel, Cobalt, and Copper at -195°. A. C. Zettlemoyer, Yung Fang Yu, J. J. Chessick, and F. H. Healey. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1319-1322.

The initial stages of the successive oxidations of reduced Ni, Co, and Cu powders were studied at -195 C. During the oxidation of the metal several portions of O were adsorbed: an oxide layer, a chemisorbed layer of O^{-1} ions, and ordinary physically adsorbed molecules.

967 Corrosion Resistant Materials—Metals and Alloys. Lester F. Spencer. *Metal Finishing*, v. 55, Oct. 1957, p. 58-62.

Lead, lead alloys, and stainless steels are discussed.

968* (French.) Effect of Oxidation on the Superficial Chemical Composition of Refractory Alloys. **Influence de l'oxydation sur la composition chimique superficielle des alliages réfractaires.** F. Malamand and G. Vidal. *Metaux, Corrosion-Industries*, v. 32, July-Aug. 1957, p. 286-299.

Determining the superficial change of the chemical composition in the metallic phase immediately underlying the oxide layer. spectrographic analysis of 5μ depths. Application to Nimonic 80 and 95 alloys used in turboreactors.

969* (French.) Contribution to the Study of Oxidation of Iron in Air Between 700 and 1250 C. **Contribution a l'étude de l'oxydation du fer dans l'air dans l'intervalle 700-1250° C.** Jean Paidassi. *Revue de Métallurgie*, v. 54, Aug. 1957, p. 569-585.

Studies on Armco iron and "Puron" indicate that the skin is formed by three continuous and compact Fe_2O_3, Fe_3O_4, and FeO layers, the isothermic growth rate of which is parabolic The relative thicknesses of the layers in relation to total thickness remain practically constant and are respectively 1, 4, and 95% of the total.

970* (German.) Structural Defects of Austenitic Welds in Ferritic Steels Subjected to High Temperatures. **Gefügebedingte Schäden temperaturbeanspruchter austenitischer Schweissnähte für ferritische Stähle.** Friedrich Erdmann-Jesnitzer, Manfred Beckert, and Heinz Schmiedel. *Schweissen und Schneiden*, v. 9, Sept. 1957, p. 407-414.

Study of stress-corrosion cracking caused by decarburization and diffusion of C and N in the welds.

971 (English.) **A Review of Low Temperature Corrosion From the Combustion Gases in Oil Burning Plant.** G. F. J. Murray. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, Sept. 1957, p. 280-292.

Oil fuel characteristics; factors affecting SO_3 production in boiler plant; practical application of corrosion control by addition of a small amount of ammonia to the combustion gases.

972 The Mechanism of Thermal-Gradient Mass Transfer in the Sodium Hydroxide-Nickel System. Charles E. May. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4089, Sept. 1957, 54 p. (TL570 Un3t)

Kinetic equations are theoretically derived considering separately the chemical reaction, diffusion process, and forced circulation as controlling the over-all rate of mass transfer.

See also: **535** (oxidation of Sn); **623** (corrosion of Sb); **1173** (scaling of steel billets).

METALS—EXTRACTION AND REFINING

973* (Italian.) Zone Melting Method for the Purification of Metals. **Il metodo della fusione a zone per la purificazione dei metalli.** T. Federighi. *Alluminio*, v. 26, Sept. 1957, p. 361-366.

Fundamental principles. Properties of pure metals and the influence of impurities.

974* (German.) Studies on the Iron(II) Oxide-Magnesium (II) Oxide Diagram, and Its Relation to the Deoxidation of Pure Iron With Manganese. **Untersuchungen über das Zustandsschaubild Eisen(II)-oxyd-Mangan(II)-oxyd und seine**

Beziehung zur Desoxydation von reinem Eisen mit Mangan. Hermann Schenck, Norbert G. Schmahl, and A. K. Biswas. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 517-521.

Determination of liquidus-solidus curves. Thermodynamic computations indicate the highest values for the fusion heat are: ΔH_{MnO}=10500 cal. per mol. and ΔH_{FeO}=8000 cal. per mol. The m. p. for MnO was found to be 1750 C.

975* Directional Solidification in Castings. L. M. Hogan. *Australasian Engineer*, v. 50, Sept. 1957, p. 64-69.

Cause and mechanism of shrinkage porosity in castings; the concept of directional solidification and its application to ingot and sand casting.

976 On the Basic Pneumatic Processes of Steelmaking. P. Coheur and H. Kosmider. *Blast Furnace and Steel Plant*, v. 45, Oct. 1957, p. 1131-1139.

The basic Bessemer process and its present state of development. Bottom, top, and side blowing.

977 Reduction Experiments on Steep-Rock Ore. J. O. Edström. *Henry Brutcher Translation No.* 3842, 7 p. (From *Jernkontorets Annaler*, v. 140, no. 2, 1956, p. 130-136.) Henry Brutcher, Altadena, Calif.

Micrographic, X-ray, and chemical analyses of Steep-Rock ore from Canada. Microstructure of Fe obtained by reduction of Steep-Rock ore with CO at 1830 F.

978 Investigation of Forces Acting on the Various Parts of a Continuous Steel-Casting Machine. V. F. Shchukin. *Henry Brutcher Translation No.* 4022, 6 p. (From *Stal'*, v. 17, no. 4, 1957, p. 320-322.) Henry Brutcher, Altadena, Calif.

Technique of measurements of the forces resisting the withdrawal of the billet from the mold; pressure exerted by withdrawing rollers on the billet; torque on the universal spindles; current, voltage, and speed of electric motors. Causes and nature of deflection of billet during operation.

979 How the Theory of Solidification and Crystallization Can Contribute to the Development of Continuous Casting. N. Chvorinov. *Henry Brutcher Translation No.* 4023, 20 p. (From *Hutnické Listy*, v. 12, no. 3, 1957, p. 196-201.) Henry Brutcher, Altadena, Calif.

The process of solidification of steel and its theoretical treatment. Application to continuous casting. Effect of cooling rate on rate of solidification of steel. Influence of shape of billet section. Rate of cooling and surface defects of continuous cast billets; suggested replacement of water-spray cooling by more advanced methods, for example, Al blocks.

980 Refining of Steel With Oxygen in a Rotating Furnace by the Kaldo Process. B. Kalling and F. Johansson. *Henry Brutcher Translation No.* 4025, 23 p. (From *Jernkontorets Annaler*, v. 141, no. 4, 1957, p. 189-205.) Henry Brutcher, Altadena, Calif.

Report on the latest results obtained with the Kaldo process. General features; furnace design and operation; refining action; progress of heats. Materials best suited as coolants, heat economy, and data on ingot yield (compared with other processes).

981 The Hydrogen Reduction of Boron Trichloride on Alloy Wires. E. A. Belmore and A. M. Teller. *Hooker Electrochemical Company (U. S. Atomic Energy Commission)*, NYO-1269, Aug. 1956, 30 p. (UF767 U3ny Contin.)

Some minor improvements in the alloy wire process for reducing BCl_3 contributed toward a longer wire life and easier operating conditions. These should tend to produce a proportional reduction in cost.

982 Vacuum Arc Melting Installation of Novel Design at Universal Cyclops. *Industrial Heating*, v. 24, Sept. 1957, p. 1786 + 2 pages.

Furnace can melt ingots 16-in. diameter by 66-in. long.

983 Blast-Furnace Slags. Their Liquidus and High-Temperature Properties. B. G. Baldwin. *Iron & Steel*, v. 30, Oct. 9, 1957, p. 522-526.

The Welch cell to determine the liquidus point of blast furnace slags is described.

984 Studies on Ingot Feeder Heads. H. S. Marr, G. Fenton, and W. H. Glaisher. *Iron and Steel Institute, Journal*, v. 187, Oct. 1957, p. 81-92.

Ways of increasing efficiency are based on findings that the hot-top lining needs to have low heat capacity to give high efficiency. Gives recommendations for improving methods of hot-topping and the increase in yield which may be expected in each case.

985* (Russian.) The Smelting of Bearing Steel in Large Electric Furnaces. **Vyplavka sharikopodshipnikovoi stali v bol'shikh elektropechakh.** V. M. Sebast'ianov. *Metallurg*, v. 2, no. 10, Oct. 1957, p. 9-10.

The smelting process in electric furnaces of 20 and 40 ton capacity. Composition of charge; chemical composition and yield of the obtained steel.

986* (Russian.) The Smelting of Transformer Steel. **Vyplavka transformatornoi stali.** V. A. Lakhno. *Metallurg*, v. 2, no. 10, Oct. 1957, p. 11-12.

Step by step description of smelting process.

987 Zone Melting. W. G. Pfann. *Metallurgical Reviews*, v. 2, no. 5, 1957, p. 29-76 + 4 plates.

Types of zone melting processes; zone-refining theory and practice; the distribution coefficient; zone leveling and single-crystal growth; temperature-gradient zone melting.

988 Economics of the New Iron Ore Reduction Processes. E. C. Wright. *Metal Progress*, v. 72, Oct. 1957, p. 99-104.

At least 4,000,000 Btu. per ton more energy is required than for the conventional blast furnace and openhearth.

989 Vacuum Induction Melting—Process Considerations. W. E. Jones. *Metal Progress*, v. 72, Oct. 1957, p. 133 + 7 pages.

Notable improvements result in high-temperature properties of heat resistant alloys.

990 Decontamination of Thorium-Uranium Alloy by Nonconsumable Electrode Arc-Melting. E. W. Murbach and A. G. Buyers. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1989, Sept. 1957, 14 p. (UF767 Un3.1na Contin.)

The rare gases and the more volatile elements are effectively removed by arc-melting. The rare earths are partially removed; the more refractory metals are not evaporated. Uranium and protactinium can be lost by excessive heating.

991 Removal of Fission Products From Molten Thorium-Uranium Alloy Resulting From Gravity Flow Through Frozen Calcium Fluoride Beds. A. G. Buyers, J. Chilton, and W. E. McKee. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-2047, Oct. 1957, 17 p. (UF767 Un3.1na Contin.)

992 Mathematical Treatment of a Typical Zone-Melting Process. G. Braun. *Philips Research Reports*, v. 12, Oct. 1957, p. 385-414.

This process aims at the realization of a homogeneous distribution of a solute (which may be volatile) in an ingot. The mathematics determine the asymptotic behavior of the solution of a system of differential-difference equations by means of a generating function.

993* Liquid Steel Temperature Measurement. A Review of the Quick-Immersion Thermocouple Method. W. C. Heselwood and D. Manterfield. *Platinum Metals Review*, v. 1, Oct. 1957, p. 110-118.

Design of the Pt thermocouple assembly; general use and development; checking and calibration; maintenance; metallurgical value.

994* (French.) Rationalizing the Basic Bessemer Operation. **La rationalisation de l'opération Thomas.** J. Marot. *Silicates Industriels*, v. 22, Sept. 1957, p. 468-474.

Operational control by controlling the blast and continuous measurement of both temperature and flame appearance. Devices used and results.

995* (Russian.) Smelting of Copper Sulfide Concentrates With Application of Oxygen-Blasting. **Plavka mednykh sul'fidnykh kontsentratov na kislorodnom dut'e.** M. A. Shakhnovskii. *Tsvetnye Metally*, v. 30, no. 9, Sept. 1957, p. 49-57.

Design and method of operation of an industrial furnace incorporating oxygen-enriched blast. Schemes for feeding; equipment for drying of charge materials; gas-purifying systems. Theoretical and experimental studies of the smelting process.

996* (Russian.) Preparation of Pure Silicon by the Thermal Decomposition of Silane. **Poluchenie chistogo kremniia termicheskim razlozheniem silana.** S. I. Kleshchevnikova, Ia. E. Pokrovskii, and E. I. Rumiantseva. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1645-1648.

Method and equipment. Decomposition takes place on a Ta support heated by current to 950 C. Resulting crust of the polycrystalline Si can be separated from the Ta in a form suitable for zonal recrystallization. Obtained monocrystals possess *p*-type conductivity, have specific resistance up to 50 ohm. cm.

See also: **1015** (casting of Zr and Ti); **1157** (solid solutions in Ti slags); **1274** (reprocessing nuclear fuel).

METALS—FINISHING, POLISHING, AND CLEANING

997* (Dutch.) Pickling Iron and Steel in Mineral Acids. **Beitsen van ijzer en staal in minerale zuren.** M. Apperloo. *Bedrijf en Techniek*, v. 12, no. 287, Sept. 7, 1957, p. 604-606.

Advantages and disadvantages of pickling in HCl, H_2SO_4, and H_3PO_4. Regeneration based on ion exchange.

998 A Study of the Deformed Layer Produced on Metal Surfaces by Mechanical Machining, Abrasion and Polishing Operations. L. E. Samuels. *Electroplating and Metal Finishing*, v. 10, Oct. 1957, p. 315 + 4 pages.

Machining, abrasion, and metallographic polishing operations; production of deformation-free surfaces.

999 The Nature of Mechanically Polished Metal Surfaces: The Surface Deformation Produced During the Abrasion and Polishing of Zinc. L. E. Samuels and G. R. Wallwork. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 43-48.

The deformed layer detected on abraded surfaces consists of two parts: an outer recrystallized layer and a subsurface layer containing deformation twins and kink bands. The layer produced during polishing is of an entirely different nature, consisting of isolated rays of twinned material associated with individual polishing scratches.

1000* (German.) The Importance of the Barrel Burnishing Process for the Surface Treatment of Metals. **Die Bedeutung des Kugelpolierens für die Oberflächenbehandlung von Metallen.** M. Dreher. *Metall*, v. 11, Sept. 1957, p. 752-754.

Review of methods, advantages, and possibilities of barrel finishing.

1001 Barrel Tumbling: How to Get Best Results. R .W. Fitch. *Products Finishing*, v. 22, Oct. 1957, p. 28 + 10 pages.

Specific recommendations as to media, water, compounds, barrel speeds, rinsing, drying, and separating media from parts.

1002* (German.) The Use of the New Powerful Ultrasonic Equipment for Cleaning Purposes. **Eine neue leistungsstarke Ultraschallanlage hoher Reinigungsreichweite für Grossflächenreinigung.** Rolf Esche and Paul Wenk. *Siemens Zeitschrift*, v. 31, Sept. 1957, p. 469-472.

Description of equipment and its use for cleaning of finished and semifinished articles.

See also: **868** (surface finish microscope).

METALS—FOUNDRY PRACTICE

1003* The Effect of Aluminium on the Inoculating Power of Ferro-Silicon and Its Tendency to Give Pinholing. J. V. Dawson. *British Cast Iron Research Association. Journal of Research and Development*, v. 7, Aug. 1957, p. 2-9 + 6 plates.

At least 1% Al is necessary in the ferro-silicon addition to give a strong inoculating effect in light section nodular castings. Good inoculation in heavy section nodular castings can be obtained by using ferro-silicon additions with lower Al contents. The increase in the inoculating power of ferro-silicon due to raising its Al content is demonstrated in gray cast iron by its effect in removing chill and in raising the number of eutectic cells per unit area. A relationship is shown to exist between mechanical strength and cell count: the mechanical properties of the gray iron improved with increasing cell count.

1004* A Note on the Influence of Furnace Holding Time on Chill and Mottle Formation. J. Rickard. *British Cast Iron Research Association. Journal of Research and Development*, v. 7, Aug. 1957, p. 23-26 + 2 plates.

The depth of chill and of mottle increases as the furnace holding time increases. Mottle is also shown to become more coarse.

1005* (Italian.) The Determination of Gas in the CO_2 Process. **Il dosaggio del gas nel procedimento al CO_2.** Rinaldo Cattaneo. *Fonderia*, v. 6, Aug. 1957, p. 341-343.

Description of the process. Kinetics of the fundamental reaction. Introduction of other materials such as 50% of $Na_2O(SiO_2)_n$. Change of color due to the pH variation of the molding mass.

1006* (Italian.) Cupola Furnace Operation. **Condotta del cubilotto.** Dennis F. O'Connor and Carlo Morgani. *Fonderia*, v. 6, Aug. 1957, p. 345-354.

Foundry requirements for the production of a fused metal at the appropriate temperature for casting.

1007 Speaking of Investments. H. J. Meerkamp van Embden. *Foundry Trade Journal*, v. 103, Sept. 19, 1957, p. 339-344.

Discusses problems of the investing technique used to produce precision castings, based on reasoning and simple theories.

1008 Defects in Cast Iron for Enamelling Purposes. *Foundry Trade Journal*, v. 103, Sept. 26, 1957, p. 363-366.

Important points for eliminating rejects are: improved design to ensure even wall thickness and the prevention of high-stress points; control of the casting temperature, location of chills, together with mold design to ensure uniform cooling rates, with subsequently even structures, and improved feeding, coupled with high surface finish and accurate moisture control of the molds to prevent the incidence of surface porosity and inclusions.

1009 Malleable Production at the Nacton Foundry of Ransomes, Sims & Jefferies, Limited. H. A. Wincer. *Foundry Trade Journal*, v. 103, Oct. 10, 1957, p. 423-431.

A step by step account of the plant and equipment of an old company undertaking a new product.

1010 Mechanization for Shell Moulding. *Foundry Trade Journal*, v. 103, Oct. 10, 1957, p. 433-437.

A report of progress from South Africa.

1011* (German.) Development and Operation of the Hot-Blast Cupola Furnace. **Entwicklung und Praxis des Heisswindkupolofens.** Ernst Löbbecke. *Giesserei*, v. 44, Aug. 29, 1957, p. 505-515.

Construction of a hot-blast cupola furnace and examination of the metallurgical and pyrometric problems which affect its development. Operating experiences with various linings.

1012* (German.) Practical Suggestions for the Application of Pouring Gates of Exothermic Material in the Steel Foundry. **Praktische Winke zur Anwendung von wärmespendenden Trichtereinsätzen in der Stahlgiesserei.** Karl Reimann. *Giesserei*, v. 44, Sept. 12, 1957, p. 550-552.

Design of exothermic gates. Cost savings.

1013* (German.) Surface Defects of Cast Steel. **Oberflächenfehler bei Stahlguss.** Fritz Brunn. *Giessereitechnik*, v. 3, Aug. 1957, p. 172-173.

Relation between cast steel surface defects and types of molds. Use of mold material with a high melting temperature is suggested.

1014 Systematic Control Guides Production of High Quality Gray Iron Castings. A. W. Schneble. *Industrial Heating*, v. 24, Sept. 1957, p. 1860 + 6 pages.

1015 Titanium and Zirconium Casting Developments by the U. S. Bureau of Mines. A. H. Roberson. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 1-6.

Castings weighing up to 75 lb. can be produced successfully without contamination using consumable-electrode arc-melting furnaces of the bottom-pour crucible and tilting crucible types. Massive scrap, clean chopped machine turnings, and sponge can be fabricated into satisfactory electrodes. Machined graphite, rammed granular graphite, or Cu or Al are used as mold materials.

1016 Compressed-Air Risers. D. R. Kononow. *Iron and Steel*, v. 30, Oct. 1957, p. 489-491.

(Translated from the Russian.) Use of compressed air risers to improve yield and quality of steel castings.

1017* (Russian.) Production of Large Cast Iron Machine Tools With Forced Air Cooling of the Molds. **Proizvodstvo krupnykh chugunnykh stanochnykh otlivok s prinuditel'nym vozdushnym okhlazhdeniem formy.** I. V. Mitichev. *Liteinoe Proizvodstvo*, 1957, no. 9, Sept., p. 11-16.

Development of a new casting technology using forced air cooling to shorten the production cycle and to improve the structure of the metal by speeding up the cooling process of castings in sand molds.

1018* (Russian.) Magnesium Treatment of Low-Sulfur Cast Iron Smelted in the Basic Cupola. **Obrabotka magniem malosernistogo chuguna, vyplavlennogo v osnovnoi vagranke.** G. I. Kletskin. *Liteinoe Proizvodstvo*, 1957, no. 9, Sept., p. 21-26.

Study of the most efficient technology in production of Mg cast iron and its introduction into industry. Describes method of treatment, and effect of S content and other factors on the smelting process in a basic cupola; characteristics of the cupola and the basic lining.

1019* (Russian.) Experiments in Application of Quick-Setting Binders in High-Speed Production of Molds and Cores. **Opyt primeneniia bystrotverdeiushchikh sviazuiushchikh materialov dlia skorostnogo izgotovleniia liteinykh form i sterzhnei.** V. A. Sokolova. *Liteinoe Proizvodstvo*, 1957, no. 9, Sept., p. 26-30.

Use of quick-setting binders improves quality of medium and large cast iron and steel castings, usually cast in dry molds.

1020 The Manufacture and Use of Large Aluminium Die Castings. *Machinery (London)*, v. 91, Sept. 27, 1957, p. 757-762.

Steels for large dies; automatic ladling equipment; control of die casting quality.

1021* Sealing Core Boxes Against Blow-By. Richard L. Olson. *Modern Castings*, v. 32, Oct. 1957, p. 41-52.

Diagrams illustrate how the erosive forces of air and sand can be controlled in core boxes.

1022* Add Life, Cut Cares, Use Carbon Refractories in Cupola Construction. G. B. Tatum. *Modern Castings*, v. 32, Oct. 1957, p. 58-64.

Carbon blocks resist slag attack and have high strength at elevated temperatures.

1023 Vacuum as an Aid to Better Castings. Edward S. Czorniak. *Precision Metal Molding*, v. 15, Oct. 1957, p. 39 + 2 pages.

Vacuum in the mold cavity to produce close-grained, high-density castings free from porosity and inclusions is described.

1024 Powdered Glass Gives Mold for Stronger Castings. R. A. Youngs and J. C. Heymann. *Product Engineering*, v. 28, Oct. 14, 1957, p. 68-71.

New investment casting development produces fine grain, better strength and ductility of parts; allows wider choice of materials.

1025* (Polish.) Application of Radioactive Isotopes in the Foundry. **Zastosowanie izotopów promieniotwórczych w odlewnictwie.** Zdzisław Durmała. *Przegląd Odlewnictwa*, v. 7, no. 8, Aug. 1957, p. 231-238.

Use in checking melting and casting processes and investigating the mechanism of the formation of impurities. Quality inspection of castings by the radiographic method.

See also: **975** (directional solidification in castings); **1034** (protective atmospheres); **1130** (production of cast iron rolls).

METALS—HEAT TREATMENT

1026* Impact Properties of Slack-Quenched Alloy Steels. Melvin R. Meyerson and Samuel J. Rosenberg. *Journal of Research, National Bureau of Standards*, v. 59, Oct. 1957, p. 273-288.

Slack quenching was shown to be detrimental to the impact properties of steels of the 81xx type.

1027 Induction Heating for Merchant Mill. R. S. Segsworth. *Metal Progress*, v. 72, Oct. 1957, p. 129-132.

A 6.5-in. square steel ingot reaches rolling temperature in 8.4-min. when pushed through a long induction coil, the first half of which receives 60-cycle current and the second half, 540-cycle current.

1028 Industrial High-Frequency Heating. Modern Developments in Germany. *Metal Treatment and Drop Forging*, v. 24, Sept. 1957, p. 358-361.

Inductive H.F. heating and dielectric heating are assessed.

1029 Stress Annealing in Vacuum Deposited Copper Films. H. S. Story and R. W. Hoffman. *Physical Society, Proceedings*, v. 70, no. 454B, Oct. 1957, p. 950-960.

Study of stress changes during pulse annealing was made with Cu films deposited at several substrate temperatures between −150 and +75 C. The annealing spectrum shows a prominent peak centered near room temperature.

1030 Lines Anneal Fast Without Soaking. *Steel*, v. 141, Oct. 14, 1957, p. 124 + 3 pages.

Set-up handles 60 tons of tin plate per hr.

1031* Rotary Retort Furnace, Duplex Quench Improves Case Hardening of Fasteners. William Schmidt. *Western Metals*, v. 15, Oct. 1957, p. 43-45.

Description and operation of automatic case-hardening line.

1032* Salt Bath-Free Fall Quench Cuts Distortion. *Western Metals*, v. 15, Oct. 1957, p. 46-47.

Solution heat treatment of formed Al parts.

1033* Continuous, Rapid Heat Processing Makes High Strength, Seamless Oil Tubing. *Western Metals*, v. 15, Oct. 1957, p. 57 + 2 pages.

1034* (Polish.) Protective Atmospheres. **Atmosfery ochronne.** Marian Chyla. *Wiadomości Hutnicze*, v. 13, nos. 7-8, July-Aug. 1957, p. 208-217.

Use of protective gases in foundry furnaces, and their effect on steel, alloying components, and carbon content. Classification of gases according to their effect in a certain process.

1035* Comparison of Gas and Electric Strand Annealing Furnaces. Harold Notarius. *Wire and Wire Products*, v. 32, Oct. 1957, p. 1184 + 8 pages.

A complete analysis was made of two furnaces, one gas fired and the other electrically heated, that are used to strand anneal wire continuously. Both units were of the same size and operated under similar conditions. The furnaces were compared as to costs, efficiencies, and heat losses. The electric furnace is recommended.

1036* Continuous Electric Direct Resistance Method for Heat Treating of Steel Wire. Oscar C. Trautman. *Wire and Wire Products*, v. 32, Oct. 1957, p. 1213-1218.

Equipment and methods for resistance heating; advantages and disadvantages; properties of the drawn wire.

See also: **1149** (annealing at 1200 C and diffusion in Fe-Cr alloy); **1171** (induction heating of Ni steel); **1182** (quenching of Au); **1188** (quenching of Cr-Mo steel); **1537** (stress relieving of welds).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

1037 A Theory of the Fracture of Metals. A. N. Stroh. *Advances in Physics*, v. 6, Oct. 1957, p. 418-465 + 4 plates.

Strength of the ideal lattice; brittle fracture; lower yield point; brittle-ductile transition; propagation of cracks; ductile fracture.

1038 The Vapor Pressure of Thulium Metal. F. H. Spedding, R. J. Barton, and A. H. Daane. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5160-5163.

Measurements between 809 and 1219 K.

1039* The Effect of Fabricated Edge Conditions on Brittle Fracture of Structural Steels. L. A. Harris and N. M. Newmark. *American Railway Engineering Association, Bulletin*, v. 59, Sept.-Oct. 1957, p. 245-289.

Specimens of the four steels tested were fabricated with the test edges prepared either by shearing, machining, and manual or automatic flame cutting. Effect and of a weld arc-strike on a machined or sheared edge and effect of manually flame softening a sheared or flame-cut edge were also studied.

1040* (German.) Glide Traces on the Surface of High-Purity Aluminum Subjected to Alternating Bending Stresses. **Gleitspuren an der Oberfläche von biegewechselbeanspruchtem Reinstaluminium.** Max Hempel and Angelica Schrader. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 547-556.

Alternating bending tests on polished flat samples of polycrystalline 99.99% Al.

1041* (Polish.) Effect of Non-Homogeneity on the Deformation of Copper During the Tensile Test. **Wpływ niejednorodności na odkształcenie miedzi w próbie rozciągania.** Wojciech Truszkowski and Andrzej Dedo. *Archiwum Hutnictwa*, v. 2, no. 3, 1957, p. 205-221.

Investigations on nine samples of Cu containing amounts of impurities.

1042* (Polish.) Thermodynamic Properties of Irregular Solutions. **Własności termodynamiczne roztworów nieregularnych.** Władysław Ptak. *Archiwum Hutnictwa*, v. 2, no. 3, 1957, p. 269-286.

Thermodynamic functions of Sn-Zn, Sn-Cd, and Sn-Cd-Zn alloy systems.

1043 Effects of High Burnup on Natural Uranium. J. H. Kittel and S. H. Paine. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5539, May 1957, 45 p. (UF767 Un3.1an Contin.)

Results from experiments in which unrestrained specimens of unalloyed natural U were irradiated to total atom burnups ranging up to 1.82% (15,000 MWD/T) at temperatures from 50 to 220 C. A few specimens were also thermally cycled.

1044 An Investigation of Thermal-Stress Fatigue as Related to High-Temperature Piping Flexibility. L. F. Coffin, Jr. *ASME, Transactions*, v. 79, Oct. 1957, p. 1637-1651.

Studies the effect of cycling which produces tensile rather than compressive stress under the hot condition, and the effect of reducing the net mechanical strain range for a given temperature range to a point approaching the design strains for a piping system.

1045* (Russian.) Effect of Macrostructure and Surface Condition of Steel Dies on the Formation of Thermal Fatigue Cracks. **Vliianie makrostruktury stali i sostoianiia poverkhnosti shtampov na obrazovanie v nikh treshchin termicheskoi ustalosti.** D. I. Kostenko. *Avtomobil'naia i Traktornaia Promyshlennost'*, 1957, no. 8, Aug., p. 29-34.

It was found that surface deterioration of dies occurs soonest in dies which have less dense structure and whose surface fineness is low. Of the specimens tested, poorer behavior was exhibited by the carburized samples than those machined with cutting tools and polished; best of all were those hardened by shot peening.

1046* Theories of Metallic Creep. J. M. Summerton. *Birmingham Metallurgical Society, Journal*, v. 37, Sept. 1957, p. 537-552.

Characteristics of creep curves; time laws of creep; transient and steady state creep; high-temperature creep; structural changes.

1047 The Measurement of Meyer Hardness and Young's Modulus on the Rockwell Test Machine. D. K. MacKenzie and T. P. Newcomb. *British Journal of Applied Physics*, v. 8, Oct. 1957, p. 398-399.

1048 Effect of Differences in Ductility on Fracture Patterns. F. P. Rybalko. *Henry Brutcher Translation No.* 3923, 4 p. (From *Fizika Metallov i Metallovedenie*, v. 3, no. 1, 1956, p. 185-186.) Henry Brutcher, Altadena, Calif.

Study of changes in ductility (induced by tempering in quenched plus polished 0.45% C, 0.9 Cr, 1.65 Ni, 0.25 Mo, 0.15 V steel cylinders) in relation to appearance of their (tensile) fracture surfaces.

1049 Study of Deformability of Technical Iron in the As-Cast State. G. N. Mekhed. *Henry Brutcher Translation No.* 3970, 8 p. (From *Metallovedenie i Obrabotka Metallov*, no. 8, Aug. 1956, p. 43-47.) Henry Brutcher, Altadena, Calif.

Effect of testing temperature on ductility. Behavior in rolling, static and impact tensile tests, and impact compression (upsetting) test at temperatures ranging from ordinary to 1200 C. Effect of S and O contents on ductility at 850 to 1050 C; effect of Mn content.

1050 Effect of Metallurgical Factors Upon Temper Brittleness. S. M. Baranov. *Henry Brutcher Translation No.* 4013, 13 p. (From *Metallovedenie i Obrabotka Metallov*, no. 12, Dec. 1956, p. 40-45.) Henry Brutcher, Altadena, Calif.

Study of relationship between melting practice and structure plus properties of steel. Importance of formation of SiO for occurrence of reversible and irreversible temper brittleness. Principles of melting steel so as to be free from temper brittleness. Some results of experimental heats made with and without Si for deoxidizing and alloying. Theory of effect of SiO, with special reference to the action of surface-active Si-O compounds in steel.

1051 Variation of Mechanical Properties of Vacuum-Melted and Vacuum-Cast Steel Ingots in Different Directions. Ia. B. Gurevich. *Henry Brutcher Translation No.* 4017, 7 p. (From *Stal'*, v. 16, no. 9, 1956, p. 815-817.) Henry Brutcher, Altadena, Calif.

Investigation of tensile and torsional properties of small steel ingots melted and cast in vacuum; specimens are cut from ingots in three different directions.

1052* Microcracking in Mild Steel Weld Metal. I. K. Winterton. *Canadian Metalworking*, v. 20, Sept. 1957, p. 34 + 5 pages.

A general theory is put forward to account for microcracking in terms of the accumulation of H under pressure in pre-existent flaws. The effect of relatively small deviations in plate temperatures on low temperature cooling rates is quite pronounced. (To be concluded.)

1053* (French.) Remarks on the Laws of Creep. **Remarques sur les lois du fluage.** Charles Crussard. *Comptes Rendus*, v. 245, Sept. 23, 1957, p. 1045-1048.

At the beginning of a continuous creep test, after a sudden elongation, a "primary" creep phenomenon with decreasing speed was observed. Experimental and theoretical study of this creep stage.

1054* (Russian.) Critical Range of Brittleness of Electro-Technical Steels. **Kriticheskii interval khrupkosti elektrotekhnicheskikh stalei.** N. I. Lapkin, G. N. Shubin, and S. I. Doroshek. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 478-482.

Determination of plastic properties of electrical steels containing 1.0 to 5.8% Si, by various testing methods in the temperature range from −80 to +300 C. Determination of critical range of brittleness of dynamo and transformer steels in relationship to Si content. Shows that low temperature heating (100 to 250 C) increases the plasticity of high-alloy transformer steel 15-20 times and decreases defects caused by brittleness.

1055* (Russian.) Brittle Failure of "Cuprite". **Khrupkoe razrushenie krasnoi medi.** S. K. Maksimov. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 483-489.

Investigation of high-purity Cu "cuprite M-1" under static loads at temperatures up to 350 C. Dependence of strength on temperature and load duration.

1056* (Russian.) Some Peculiarities of the Electric Conductivity of Ni-Cr Alloys. **Nekotorye osobennosti v elektrosoprotivlenii nikel'-khromistykh splavov.** S. D. Gertsriken and A. V. Progrushchenko. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 505-510.

Experimental investigation of Ni_3Cr and Ni_5Cr with addition of 7% Mo.

1057 Aluminum Alloy Welding Neck Flanges' Performance Equal to Carbon-Steel. H. H. George, E. C. Rodabaugh, and M. Holt. *Heating, Piping & Air Conditioning*, v. 29, Oct. 1957, p. 95-97.

Tests indicate that 6061-T6 Al alloy flanges made to ASA B16.5 dimensions are essentially equal in performance to comparable carbon-steel flanges.

1058 (German.) Critical Magnetic Fields of Superconductive Vanadium. **Kritische Magnetfelder von supraleitendem Vanadium.** G. Busch and J. Müller. *Helvetica Physica Acta*, v. 30, no. 4, 1957, p. 230-233.

Five specimens of pure V were prepared by thermal dissociation of the Iodide. Micrographs showed a compact structure with a crystallite grain size of a few tenths of a mm. The penetrating field was measured at a constant temperature.

1059 The Plastic Deformation of Aged Aluminium Alloys. G. Thomas and J. Nutting. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 7-14.

The electron microscope was used to study the metallography of the slip characteristics of alloys containing 4% Cu and 7% Mg, respectively. In 4% Cu alloys the slip bands change from coarse, [1]→G.P.[2]→θ'. In 7% Mg alloys slip always occurs in single steps, the slip displacements of which increase during aging. The results are interpreted in terms of depletion of solute from the matrix. Plastic deformation of alloys aged to produce coherent precipitates results in the slip lines passing through the particles, whereas when non-coherent phases are present, the slip lines bend around them. When preferential precipitation occurs at grain boundaries, plastic deformation may be confined to the adjacent, solute-denuded region. This accounts for the apparent intercrystalline failure of Al 7% Mg alloys after certain aging treatments. A description of the possible dislocation movements which would occur during the bending of a slip line around non-coherent precipitates is given in an appendix.

1060 The Young's Modulus of Some Quenched and Aged Binary Aluminium Alloys. B. J. Elliott and H. J. Axon. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 24-28.

Data on a series of binary Al-rich solid solutions containing Si, Cu, Ag, Au, and Mg in the as-quenched and also in the aged condition.

1061* The Electrical Characteristics of a Nickel-Chromium-Aluminium-Copper Resistance Wire. C. Dean Starr and T. P. Wang. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Sept. 1957, p. 515-518.

1062 Steels at Elevated Temperatures. J. D. Murray. *Iron and Steel*, v. 30, Oct. 1957, p. 493-495.

Corrosion resistance; fatigue; physical properties; effects of deoxidation practice and mechanical working on creep resistance. (To be concluded.)

1063 The Low-Temperature Impact Properties of Cast Steel. W. J. Jackson and G. M. Michie. *Iron and Steel Institute, Journal*, v. 187, Oct. 1957, p. 104-120.

In the case of the C steels, the superior impact properties of normalized material, as compared with fully annealed material, and the advantage of maintaining a low C and high Mn content were demonstrated. The effect of tempering the quenched low- and medium-alloy steels to successively higher tensile levels was to lower the maximum impact value, and to raise the transition temperature.

1064 Steady-State Creep of Crystals. J. Weertman. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1185-1189.

An expression for the steady-state creep rate of crystals is derived for the case where dislocation climb is not rate controlling. Two rate-controlling processes are considered.

1065* Some Effects of Low Temperatures and Notch Depth on the Mechanical Behavior of an Annealed Commercially Pure Titanium. Glenn W. Geil and Nesbit L. Carwile. *Journal of Research, National Bureau of Standards*, v. 59, Sept. 1957, p. 215-226.

Unnotched and notched specimens were slowly strained to fracture in tension at +150 or +100 to −196 C, to reveal the combined effects of temperature and notch geometry on tensile behavior. Impact tests were made on Charpy V-notch specimens at +300 to −196 C for determination of the impact notch-toughness. Effects of test temperature, stress system, and interstitial content on the mechanism of deformation and work-hardening characteristics were studied.

1066 (Serbian.) Diagram of Isothermal Annealing of Pure Carbon Steels. **Dijagrami izotermalnog otpushtania chistikh ugleniehnikh chelika.** B. I. Bozhich, N. Vidoievich, and R. Vukanovich. *Khemiskog Drushtva Beograd, Glasnik*, v. 22, no. 2, 1957, p. 99-111.

Relation between microstructure and hardness of carbon steels (0.1, 0.2, 0.3, 0.4, and 0.5% C) at various annealing times and temperatures.

1067 Steel for Canadian Pipelines. M. A. Scheil, G. E. Fratcher, S. L. Henry, and E. H. Uecker. *Mechanical Engineering*, v. 79, Sept. 1957, p. 853-857.

Data from burst tests on commercial pipe at subzero temperatures include strength, circumferential stretch, type of fracture, and tendency to shatter.

1068* Hardness Testing. A. Lawless. *Mechanical World and Engineering Record*, v. 137, Oct. 1957, p. 438-446.

A review of the basic theories and their application.

1069* Application of Strain Hardening Curves. *Mechanical World and Engineering Record*, v. 137, Oct. 1957, p. 464-465.

Strain hardening curves can be used to analyze the feasibility of a contemplated reduction in forming and necessity for reannealing at intermediate stages.

1070* (Russian.) Resistance to Wear Upon Saturation of a Steel Surface With Carbide Forming Elements. **Iznosostoikost' pri nasyshchenii poverkhnosti stali karbidoobrazuiushchimi elementami.** G. N. Dubinin. *Metallovedenie i Obrabotka Metallov*, 1957, no. 9, Sept., p. 21-25.

Wear resistance data are given for carbon steel surfaces containing Cr, V, Cb, W, Mo, or Mn.

1071* (Russian.) Effect of Composition of Soft Sheet Steel in Its Resilience and Aging Tendency. **Vliianie marochnogo sostava miagkoi listovoi stali na udarnuiu viazkost' i sklonnost' ee k stareniiu.** I. E. Brainin and N. V. Gubenko. *Metallovedenie i Obrabotka Metallov*, 1957, no. 9, Sept., p. 2-4.

Increase of C, Mn, P, and S in "M-3" steel decrease its resilience and do not affect its tendency to age. Increase in Si content does not affect its resilience but does slightly affect its aging tendency.

1072* (Italian.) A New Analytical Treatment of the S-N Curves, Based on Purely Probabilistic Consideration. **Sulla teoria probabilistica della fatica.** A. Ferro and R. Colombo. *Metallurgia Italiana*, v. 49, July 1957, p. 518-522.

Re-examination is made of Freudenthal's purely probabilistic theory of fatigue occurrences in metals, for which assumption is made that fatigue cycles, taken singularly or grouped, represent independent causes of failure occurring at the end of N alterations.

1073 The Future of High-Temperature Metallurgy. L. P. Jahnke. *Metal Progress*, v. 72, Oct. 1957, p. 113-118.

Predicts alloys of useful strength up to 5,500 F by 2000 A. D.

1074 The Fatigue Strength of Aluminium Alloy Lugs. J. Schijve and F. A. Jacobs. *Nationaal Luchtvaartlaboratorium, Rapport* NLL-TNM 2024, Jan. 1957, 50 p. (TL526.N3 N38.5r Contin.)

Fatigue diagrams were established for unnotched specimens and two types of lugs of 2024-T Al alloy. The stress concentration factors for the lugs are 2.65 and 3.5 respectively.

1075 How Metals Behave at Low Temperatures. Franz R. Brotzen. *Petroleum Refiner*, v. 36, Oct. 1957, p. 119-124.

Explains improvement of some metal qualities and impairment of others.

1076 On the Mechanism of Work Hardening in Face-Centered Cubic Metals With Special Reference to Polycrystalline Copper. II. P. Feltham and J. D. Meakin. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1237-1245.

Rods of annealed polycrystalline Cu were deformed in tension at 77, 195, and 293 K. The initial mode of hardening was linear up to a temperature-dependent tensile stress δ_c; the mechanism was the same as the one leading to linear hardening in single crystals.

1077 The Atomic Heats of Titanium, Zirconium and Hafnium. N. M. Wolcott. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1246-1254.

Values of the electronic specific heat coefficient were determined for these metals as 8.5, 7.25, and 6.3 X 10^{-4} cal/mole deg^2, respectively.

1078 The Hardening and Embrittlement of Steel by Irradiation With Neutrons. A. T. Churchman, I. Mogford, and A. H. Cottrell. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1271-1275.

Fracture strength increases with irradiation at the same rate as the yield strength. Radiation hardening is caused essentially by an increase in "frictional" resistance in the slip planes, such as would be produced by dispersed islands of radiation damage. The cohesive strength of the lattice and the dislocation locking stress are not detectably changed.

1079 New Type of Oscillatory Magnetoresistance in Metals. Julius Babiskin and P. G. Siebenmann. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1249-1254.

No de Haas-van Alphen oscillations were found. The magnetoresistance below 15,000 gauss exhibited a completely new type of oscillatory phenomena.

1080 Magnetic Domain Patterns on Single-Crystal Iron Whiskers. R. V. Coleman and G. G. Scott. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1276-1280.

Indicates that crystals with perfect geometry have a very simple domain structure in the unmagnetized state.

1081 Friedel Theory of Thermoelectric Power Applied to Dilute Magnesium Alloys. E. I. Salkovitz, A. I. Schindler, and E. W. Kammer. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1549-1552.

A brief review is given of several theories of the thermoelectric power of alloys. The Friedel theory is found to hold over a relatively wide range of compositions. A dependence upon the atomic number of the solute is also indicated.

1082* Creep Testing of Platinum Alloys. F. C. Child. *Platinum Metals Review*, v. 1, Oct. 1957, p. 121-126.

Details of a laboratory for determining life-to-rupture under constant stress at temperatures from 400 to 900 C, using miniature creep-testing machines.

1083* (French.) Quick Testing of the Behavior of Metals at High Temperature. **Essais rapides pour l'appréciation de la tenue à chaud des métaux.** J. Boghen and J. Hérenguel. *Revue de Métallurgie*, v. 54, Sept. 1957, p. 733-736.

Rapid tests with a simple apparatus allow study of the whole range of plastic deformation. It is possible to draw for various temperatures the curves for percent elongation according to stress after a given time, life-time and rupture elongation according to stress, and stresses inducing rupture in a given time.

1084 Production of Line Networks on Sheet Metal for the Investigation of Its Behaviour During Deformation. J. H. Zaat. *Sheet Metal Industries*, v. 34, Oct. 1957, p. 737-740.

Several methods by which networks of lines may be applied to the surface of sheet metal. Details of an essentially photographic process which confers such properties as high adherence, ability accurately to follow deformation, and absence of notch effect.

1085 (Czech.) Measuring Hardness at Higher Temperatures. **Měření tvrdosti za vyšších teplot.** E. Jelínek. *Strojírenství*, v. 7, Aug. 1957, p. 607-609.

Methods and equipment are evaluated.

1086* (Russian.) Effect of Low Temperatures on Static Strength of Weld Joints. **Vliianie nizkikh temperatur na staticheskuiu prochnost' svarnykh soedinenii.** *Svarochnoe Proizvodstvo*, 1957, no. 9, Sept., p. 8-10.

Test series in order to determine effect of low temperature on static strength of weld joints in the M16C steels used for welded bridges, boilers, and other critical constructions. Testing samples of the welded joints regularly used in bridge construction, and samples of cross-connections with high concentration of stresses. The static strength of regular weld joints of M16C steel increases when temperature decreases, while the static strength and ductility of welds with high stress concentration decreases with decreasing temperature.

1087* (Russian.) Effect of Fineness of Notch on Results of the Impact Test. **Vliianie ostroty nadreza na rezul'taty udarnykh ispytanii stali.** T. A. Vladimirskii. *Svarochnoe Proizvodstvo*, 1957, no. 9, Sept., p. 13-16.

Investigation of combined effect of temperature and notch shape on sensitivity to brittle fracture. More detailed data on mechanical properties of welded joints can be obtained from the serial test of specimens with notches of various sharpness and from diagrams showing ductility vs. temperature and radius of the notch, ductility vs. radius of the notch, and transition temperature vs. radius of the notch.

1088 Generalized Master Curves for Creep and Rupture. George J. Heimerl and Arthur J. McEvily, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4112, Oct. 1957, 31 p. (TL570 Un3t)

The similarity of Larson-Miller master curves for creep rate, rupture life, and creep strain is shown for a number of materials. By use of the approximate invariance of the product of creep rate and rupture life, the individual master curves are generalized into a single curve which is the same as the master curve for rupture. From this master curve, the creep rate and various amounts of creep strain can be predicted.

1089 The Welding of Type 347 Steels. Arthur Hoerl and Thomas J. Moore. *Welding Journal*, v. 36, Oct. 1957, p. 442s-448s.

Statistical analysis of effects of various elements on the crack sensitivity of fully austenitic Type 347 welds.

1090 A Simple Method for Calculating the Maximum Size of Ductile Rupture in Pressurized Systems. H. B. Ketchum. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-TM-56, July 1957, 24 p. (UF767 Un3.1wa Contin.)

Method predicts a maximum and minimum length of actual rupture wherein gross parting of the metal occurs and/or a maximum length for cracks which usually precede actual rupture.

1091* (Russian.) The Compression Test at High Temperatures. **Metod mekhanicheskikh ispytanii szhatiem pri vysokikh temperaturakh.** V. G. Osipov. *Zavodskaia Laboratoriia*, v. 23, no. 9, Sept. 1957, p. 1102-1104.

Development of method and equipment for continuous compression tests at temperatures up to 1800 C, to investigate mechanical properties of materials and also the nature of origination and expansion of cracks. The continuous heating of the metal is accomplished by resistance to current passing through the metal.

1092* (German.) The Theory of the Low Temperature Maximum of the Inner Friction of Metals. **Zur Theorie des Tieftemperaturmaximums der inneren Reibung von Metallen.** Hans Donth. *Zeitschrift für Physik*, v. 149, no. 1, 1957, p. 111-130.

Probable distribution of the forces exerted by the thermal lattice waves on the dislocation elements.

1093* (Russian.) A Study of the Thermodynamic Properties of Binary Metallic Systems by the Electromotive Force Method. **Issledovanie termodinamicheskikh svoistv dvoinykh metallicheskikh sistem metodom elektrodvizhushchikh sil. III.** The System Copper-Antimony. **Sistema Med'-Sur'ma.** A. A. Vecher, A. V. Nikol'skaia, and Ia. I. Gerasimov. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 6, June 1957, p. 1395-1400.

Molten Cu-Sb alloys of 6.7 to 81.7 at.% Cu content were investigated with the aid of the e.m.f. method over the temperature range 650 to 800 C.

See also: **877** (optical extensometer); **901** (combined creep and fatigue); **1026** (impact properties of steels); **1100** (edge cracking during rolling); **1135** (slip in Pb); **1161** (effect of cold work on properties); **1162** (creep of high-purity Pb); **1189** (slip in Cu); **1190** (properties of Ag-Pt alloys); **1193** (deformation of Al).

METALS—MECHANICAL WORKING

1094* (German.) Computation of the Mean Deformation Resistance and Rolling Pressure in Cold and Hot Rolling of Square Rods and Sheets. **Die Berechnung des mittleren Verformungswiderstandes bzw. des walzdruckes beim Warm- und Kaltwalzen von quadratischen stangen- und blechförmigen Körpern.** A. Geleji. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 1-2, 1957, p. 77-100.

1095 Machining Honeycomb. K. Teale. *Aircraft Production*, v. 19, Oct. 1957, p. 410-411.

Adaptations for standard machine tools.

1096 New Angle in High-Speed Turning. *American Machinist*, v. 101, Oct. 7, 1957, p. 122-123.

British toolholder cocks the cutting tool at a 50° angle to attain cutting speeds to 1600 sfpm and to reduce problems in cutting difficult materials.

1097 How to Design Practical Tooling for Cold Extrusion. John Verson. *American Machinist*, v. 101, Oct. 7, 1957, p. 129-144.

1098 Ultrafinishing—A New High-Precision Lapping Process. T. G. Lewis, Jr. *ASME, Transactions*, v. 79, Oct. 1957, p. 1699-1706.

Describes patented techniques, called ultrafinishing, including the necessary variations in velocity to permit the lapping of soft homogeneous and hard hetereogeneous metals.

1099 Factors Affecting the Swelling of Steel Bars on Cold Drawing. A. I. Kukhorev. *Henry Brutcher Translation No.* 3881, 5 p. (From *Stal'*, v. 16, no. 2, 1956, p. 181-182.) Henry Brutcher, Altadena, Calif.

Significance of C content for amount of swell in cold drawn bar stock. Relation between elastic strain in cold drawing and composition, bar diameter, amount of cold reduction, and drawing speed.

1100 Ways of Minimizing Edge Cracks (in Rolling of Electrical Sheet). N. F. Dubrov. *Henry Brutcher Translation No.* 4019, 4 p. (From *Metallurg*, v. 1, no. 12, 1956, p. 23-24.) Henry Brutcher, Altadena, Calif.

Difficulties encountered in rolling of dynamo steel with increased Si content and a 0.20 to 0.25% addition of Al. Measures adopted to minimize edge cracks: lowering the S content, increasing the Mn content, and lowering the ingot temperature prior to rolling.

1101 Depth of Strain-Hardened Layer Produced by Shot Peening. N. A. Petrova and M. Ia. Shashin. *Henry Brutcher Translation No.* 4024, 7 p. (From *Vestnik Mashinostroeniia*, v. 36, no. 11, 1956, p. 47-50.) Henry Brutcher, Altadena, Calif.

Study of depth of compressed (strain-hardened) layer produced by shot peening on hard steels. Outline of a new, universally applicable method of testing the quality of shot peening and the depth of the compressed layer, based on the change in the electrical and magnetic properties of metals owing to plastic deformation of their surface.

1102* Precision Machining of Honeycomb Steel. *Canadian Metalworking*, v. 20, Sept. 1957, p. 22.

Quick-freezing water in honeycomb cells permit these structures to be machined as readily as solid steel.

1103* Simple Counter Detects Machine Drift. *Electrical Manufacturing*, v. 60, Oct. 1957, p. 154 + 2 pages.

Automatic size control of Heald Sizematic internal grinders is achieved by post-process gaging.

1104* (Russian.) Investigation of the Texture of Rolled Stock at Elevated Temperature. **Issledovanie tekstury pri povyshennoi temperature prokatki.** K. V. Grigorov and G. P. Blokhin. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 470-473.

Determination of the influence of elevated temperature during rolling on texture and recrystallization. The texture in low C steel (0.1% C), originating during rolling at 500 C, is very close to the texture obtained in cold rolling.

1105 Milling Titanium Alloys: Experience Modifies Thinking. A. L. Winkler. *Iron Age*, v. 180, Oct. 10, 1957, p. 126-128.

Tips on milling techniques.

1106 Planetary Hot Mill. D. McQueen Potter. *Iron and Steel*, v. 30, Oct. 1957, p. 475-482.

Design and operation of mill that produces by single pass reductions of more than 90%, hot rolled strip in mild steel, alloy, and stainless steels of a quality which enables hot rolled material to be provided to cold rolled tolerances with a good surface finish and a minimum of scale. (To be concluded.)

1107* Cutting Fluids: Fundamentals and Laboratory Evaluation. L. H. Sudholz. *Lubrication Engineering*, v. 13, Sept. 1957, p. 509-515.

For accurate evaluation, actual metal cutting operations under carefully controlled conditions are required. New test techniques, such as the radioactive tracer method, are rapid, and results correlate with field experience.

1108 Machining High-Temperature Alloys. A. B. Albrecht. *Machinery*, v. 64, Oct. 1957, p. 149-153.

Alloys combining high-temperature strength and resistance to oxidation are difficult to work and must be machined at reduced cutting speeds.

1109 North American Research on Machining Titanium Alloys. Kenneth Loo. *Machinery*, v. 64, Oct. 1957, p. 157-161.

1110 30-Million Bearings a Year. *Machinery*, v. 64, Oct. 1957, p. 203-207.

Presents a tour of Timken Roller Bearing's plant at Bucyrus, Ohio.

1111 High-Speed Production From Bar Material. R. Jackson. *Machinery Lloyd (Overseas Ed.)*, v. 29, Sept. 14, 1957, p. 78-83.

Use in single- and multi-spindle automatics.

1112 Some Recent Applications of Chemical Machining. C. L. Hibert. *Machinery (London)*, v. 91, Sept. 20, 1957, p. 682-686.

Aluminum, Mg, and Ti alloys and stainless steel have all been successfully worked. Design considerations and specific applications are covered.

1113 DeLaval Turbomatic Centrifuge for the Clarification of Grinding Coolant. *Machinery (London)*, v. 91, Sept. 27, 1957, p. 769-771.

At least 99.97% of the solid content of a contaminated coolant is removed, at a rate of throughput of 2,200 gal. per hr.

1114 Back Extrusion of Heaved Walled Zircaloy-2 Cups. J. G. Goodwin and R. W. Tombaugh. *Mechanical Engineering*, v. 79, Oct. 1957, p. 936-938.

Both vertical and horizontal extrusion presses were used successfully. Impact extrusion of copper-jacketed billets was successful, whereas impact extrusions of bare billets were badly torn. It is felt that bare billets could be back extruded on a vertical press by using some lubrication.

1115 Aluminium Sheet and Strip Production. J. A. Richmond. *Metal Industry*, v. 91, Sept. 27, 1957, p. 259-264.

Shop equipment and methods.

1116 The Machinability Concept. K. G. Lewis. *Metal Treatment and Drop Forging*, v. 24, Sept. 1957, p. 351-357.

Testing methods based on tensile properties provide an indication rather than a quantitative result and require careful interpretation.

1117 Tl Intermediate Stage in Drop Forging. Importance of Correct Design. O. Kienzle and K. Spies. *Metal Treatment and Drop Forging*, v. 24, Sept. 1957, p. 367-374.

The importance of preliminary shaping of a drop forging is discussed.

1118 Precision Machining Techniques as Applied to the Manufacture of Supersonic Wind Tunnel Models. G. W. Rawlings. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 23, Feb. 1956, 21 p. (TL565 Ag11r Contin.)

1119* (French.) A Study on the Possibilities of Forged Blooming Rolls. **Les cylindres de blooming en acier forgé et les résultats que l'on peut en attendre.** Michel Massin. *Revue de Métallurgie,* v. 54, Sept. 1957, p. 707-719.

A study of 18 blooming trains to determine the influence of different factors on the wear and fracture phenomena of rolls.

1120* (German.) Argonarc - Gas Cutting of Non - Ferrous Metals. **Argonarc-Brennschneiden von Nicht-Eisenmetallen.** E. Witting. *Schweissen und Schneiden,* v. 9, Aug. 1957, p. 391-394.

The gas-shielded cutting process. Practical experience; economic considerations.

1121 Experiments on the Cold Forming of Titanium as Carried Out by Briggs Motor Bodies Ltd. P. G. Patten. *Sheet Metal Industries,* v. 34, Oct. 1957, p. 741-744.

Use of a chemical immersion coating during press forming.

1122 The Effects of High Strain Rate in Strip Rolling. D. G. Christopherson and B. Parsons. *Sheet Metal Industries,* v. 34, Oct. 1957, p. 769-775.

Experiments with a small specially designed rolling mill operating on the "Steckel" principle.

1123* (Russian.) Determination of the Heat Developed in a Part During Surface Grinding. **Opredelenie tepla, vydeliaemogo v detal' pri ploskom shlifovanii.** A. V. Podzei, N. N. Novikov, and V. E. Loginov. *Stanki i Instrument,* v. 28, no. 8, Aug. 1957, p. 33-34.

Description of a special calorimetric installation for determination of the temperature field in a part, with equipment for holding the specimens directly in the liquid bath. Results of calorimetric tests.

1124* (Czech.) The Use of Technical Dentacryl for Cementing of Cutting Dies. **Použitie technického Dentacrylu pre zalievanie priestrižníkov.** M. Bauer. *Strojírenska Výroba,* v. 5, no. 9, Sept. 1957, p. 428-430.

Fastening cutting dies in anchor plates of pressing tools. Working method and possibilities of application of this process.

1125* Tool Life Extended by Hard-Chrome Plate. Paul Topelian. *Tool Engineer,* v. 39, Oct. 1957, p. 116-118.

Cost savings with use of cutting tools protected by hard-chrome plate.

1126* Forming Titanium Sheet. *Tool Engineer,* v. 39, Oct. 1957, p. 123.

1127* A New Appraisal of the Forces in Brake Forming. William W. Wood. *Tooling and Production,* v. 23, Oct. 1957, p. 77-84.

Formulas permit prediction of the maximum force developed during brake forming for any material and any die.

1128* Cold Forming. William E. Hoffman and G. MacF. Tuttle. *Tooling and Production,* v. 23, Oct. 1957, p. 91 + 26 pages.

General information on all the conventional cold forming processes.

1129* Numerical Control Systems Standardization Sought; Machines Shown in Action. *Western Metals,* v. 15, Oct. 1957, p. 48-51.

Description of automated machine tools.

1130* (Polish.) Technical Progress in Manufacturing Cast Iron Rolls in Metallurgy. **Postęp techniczny w odlewaniu żeliwnych walców hutniczych.** Bogumił Raczyński. *Wiadomości Hutnicze,* v. 13, no. 9, Sept. 1957, p. 261-268.

Structure, construction, and working conditions of rolls for the production of heavy, medium, and thin metal sheet. Continuous hot rolling. Trimming. Rollers for cold rolling.

1131* (Polish.) Fibrous Structures in Forged Pieces. **Przebiegi włókien w odkuwkach.** Mirosław Rodek. *Wiadomości Hutnicze,* v. 13, no. 9, Sept. 1957, p. 272-277.

Discussion of factors influencing the development of fibrous structure caused by unequal distribution of strains and mechanical deformations, temperature conditions, and die characteristics.

1132* Combined Hot Rolling and Patenting of Rod. Dartrey Lewis. *Wire and Wire Products,* v. 32, Oct. 1957, p. 1179 + 6 pages.

Installation and operation of rod patenting equipment on the rod mill. Automatic temperature control procedures. Effects on microstructure and scale formation.

See also: **547** (machine tool automation); **549** (boring mill control); **556** (numerical control of machine tools); **575** (numerical control); **887** (metalworking lubrication); **905** (shot peening of springs); **1027** (induction heating for rolling mill); **1036** (wire drawing with direct resistance heat treating); **1069** (use of strain hardening curves); **1512** (gas cutting techniques).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

1133 (English.) **The Lattice Spacings of Close-Packed Hexagonal Au-In, Au-Cd, and Au-Hg Alloys.** T. B. Massalski. *Acta Metallurgica,* v. 5, Oct. 1957, p. 541-547.

An increase in the number of electrons per atom does not affect the axial ratio in Au-Hg alloys, leads to a slight decrease of axial ratio in Au-Cd alloys, and a considerable decrease with a change of slope in Au-In alloys.

1134 (English.) **Comparison of Dislocation Densities of Primary and Secondary Recrystallization Grains of Si-Fe.** C. G. Dunn and E. F. Koch. *Acta Metallurgica,* v. 5, Oct. 1957, p. 548-554.

Primaries have the higher dislocation density and therefore are the less perfect of the two kinds of grains. Calculations show the effect of the imperfections on secondary recrystallization.

1135 (English.) **Work-Hardening in FCC Metal Crystals.** P. Feltham and J. D. Meakin. *Acta Metallurgica,* v. 5, Oct. 1957, p. 555-564.

Work-hardening and slip-band formation were studied in Pb single crystals at 77, 194, and 295 K. The metal showed hemogeneous glide. Mechanisms of slip-band formation are proposed.

1136 (English.) **The Relationship Between Growth Forms and the Preferred Direction of Growth.** A. Rosenberg and W. A. Tiller. *Acta Metallurgica,* v. 5, Oct. 1957, p. 565-573.

The morphologies of the growth forms associated with the various modes of solidification of Pb crystals are observed to be related to the crystal habit planes of Pb, and the preferred orientation exhibited in the columnar zone of an ingot of Pb is observed to be related to the mode of solidification. In zone-refined lead, the mode of solidification is such as the produce a (111) preferred orientation. With the addition of 5×10^{-4} wt. % Ag, the mode of solidification changes and a 100 preferred orientation is produced.

1137 (English.) **The Structure of Oxide Films Formed on Smooth Faces of a Single Crystal of Copper.** W. W. Harris, F. L. Ball, and A. T. Gwathmey. *Acta Metallurgica,* v. 5, Oct. 1957, p. 574-581.

Not only are there large differences in rate of oxidation between faces, but within any one face there are large differences in rate, as shown by the existence of nuclei, polyhedra, and a base film.

1138 (English.) **The Driving Force for Recrystallization in Bent Single Crystals of Silver.** J. W. Semmel, Jr. and E. S. Machlin. *Acta Metallurgica,* v. 5, Oct. 1957, p. 582-596.

During an experimental study of crystals in which measurements of dislocation density were made, it was found that the energy associated with the dislocations comprised but a small fraction of the driving energy for recrystallization. Excess point defects produced by the bend deformation, in particular vacancies, provide the major source of the driving energy for recrystallization under the present experimental conditions. Two annealing stages were found during which the driving energy for recrystallization decreased to values below that necessary to achieve recrystallization on subsequent heating to high temperatures. This process is called "degradation". Specimens bent to 12% outer fiber strain or less degraded much more rapidly than specimens bent to 23% outer fiber strain. It is postulated that the vacancy-sinks are not infinite and that the longer degradation time is a measure of the time required for the excess vacancies to diffuse to the specimen surface.

1139* (English.) **The Determination of the Strength of the Interatomic Bond and the Lattice Distortion in the Case of Some Al- or Ti-Containing Compounds of High Melting Point and Their Solid Solutions.** J. S. Umanskij and S. M. Nikolaeva. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 1-2, 1957, p. 3-11.

Studies on Co-Al, Ti-Al, and Ti-C alloys.

1140* (Italian.) X-Ray Diffraction Determination of Recrystallization Curves in Al-Mg Industrial Alloys Containing From 1.5 to 5.0% of Mg. **Determinazione roentgenografica delle curve di ricristallizzazione delle leghe industriali Al-Mg, contenenti da 1,5 a 5,0% di Mg.** M. Paganelli. *Alluminio*, v. 26, Sept. 1957, p. 353-360.

For the same degree of cold work, the temperature of the beginning and of the end of recrystallization decreases with increase of Mg content.

1141 Investigation of the Ferrite Region of the Phase Diagram Fe-Co-O. J. Smiltens. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4881-4884.

Stability of the cobalto-magnetite phase at 1200 C, in equilibrium with a mixture of 98.13 vol. % CO_2 and 1.87 vol. % CO.

1142* (German.) The Effect of Small Carbon Contents on the Recrystallization of Iron. **Einfluss geringer Kohlenstoffgehalte auf die Rekristallisation von Eisen.** Frank Haessner and Paul Schwaab. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 583-590.

Determination of characteristic quantities such as incubation time, total time, and degree of recrystallization in the primary recrystallization of pure iron with 0.0015, 0.003, and 0.006% C by means of microhardness tests, structural analyses, and X-ray tests.

1143* (German.) The Iron-Silicon Antimony System. **Über das System Eisen-Silizium-Antimon.** Gerhard Zwingmann and Rudolf Vogel. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 591-595.

Thermal, chemical, and microscopic tests for determining phases in the three-component system Fe-Si-Sb with special consideration of the miscibility gap in the liquid state.

1144 A Survey of Metal Solubilities in Liquid Zinc. M. W. Nathans. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5753, July 1957, 72 p. (UF767 Un3.1an Contin.)

Literature survey of the binary phase diagrams of Zn in the Zn-rich regions ($>$ 50 at.% Zn), as well as the crystallography of the solid phases which are expected to precipitate from solution.

1145* (German.) Structural Composition and Transformation Behavior of Very Rapidly Solidfied Mg-Treated Iron Castings. **Gefügeaufbau und Umwandlungsverhalten von besonders schnell erstarrten Mg-behandelten Gusseisen.** Roland Mitsche. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 102, July-Aug. 1957, p. 204-213.

Formation of spheroidal graphite. Heterogeneous formations in the liquid state of rapidly cooled iron castings of a Mg-Ca-Si alloy with Fe-Si injection in the smelt. Structural differences. Annealing at 920 C.

1146 Electron Micrographs From Thick Layers on Aluminium. C. J. L. Booker, J. L. Wood, and A. Walsh. *British Journal of Applied Physics*, v. 8, Sept. 1957, p. 347-352.

Electron micrographs were obtained of the pore structure in the thick oxide layer formed by anodizing Al in H_2SO_4. The pores are shown to be minute tubes of approximately 200 Å diameter running perpendicularly through the oxide and ending almost in contact with the underlying metal.

1147 Measurement of the Diffusion Rate of Hydrogen in Nickel. A. G. Edwards. *British Journal of Applied Physics*, v. 8, Oct. 1957, p. 406-409.

The observed outgassing of H soaked Ni can be explained in terms of Fick type diffusion without significant surface barrier effects. The diffusion rate is given by $D = D_o \exp - b/T$ where $D_o = 1.1 \times 10\text{-}2_{cm}2_s\text{-}1$, $b = 5100$ K.

1148 Tempering Phenomena in Martensite. I. W. Jellinghaus. *Henry Brutcher Translation No.* 3876, 28 p. (From *Archiv für das Eisenhüttenwesen*, v. 27, no. 7, 1956, p. 433-440.) Henry Brutcher, Altadena, Calif.

Magnetic, electrical (resistance and coercive force), and dilatometric studies of tempering steel, based on long-time experiments at constant temperatures and intended to determine the extent to which the chages in physical properties are tied to definite temperatures; also to formulate the kinetic law governing the tempering phenomena.

1149 Effect of Annealing at 1200 C (2190 F) on the Energy of Activation for Diffusion of Chromium in Iron-Chromium Alloys. A. G. Lesnik. *Henry Brutcher Translation No.* 3925, 6 p. (From "Problems of Metal Physics and Metallography", a Collection of Papers From the Metal Physics Laboratory of the Ukrainian Academy of Sciences, no. 5, 1954, p. 118-122.) Henry Brutcher, Altadena, Calif.

Investigation of the change in energy of activation for diffusion of Cr as a function of the time of annealing. Reasons for observed changes; ordering process in austenitic, austenitic-ferritic, and ferritic alloys.

1150 Microstructure of Iron-Chromium Alloys Annealed for Different Periods at 1200 C(2190 F). A. G. Lesnik and N. P. Plotnikov. *Henry Brutcher Translation No.* 3927, 8 p. (From "Problems of Metal Physics and Metallography", a Collection of Papers From the Metal Physics Laboratory of the Ukrainian Academy of Sciences, no. 5, 1954, p. 123-127.) Henry Brutcher, Altadena, Calif.

Effect of high-temperature annealing of Fe-Cr alloys on rate of decomposition of primary solid solution, assessed from the quantity of σ-phase eventually formed.

1151 Segregation in Fusion Zone and in Solidification Layers as Related to the Diffusion Between Solid and Liquid Phases in the Freezing of Welds. A. M. Makara and A. A. Rossoshinskii. *Henry Brutcher Translation No.* 3991, 20 p. (From *Avtomaticheskaia Svarka*, v. 9, no. 6, (51), 1956, p. 65-76.) Henry Brutcher, Altadena, Calif.

Study of heterogeneity in fusion zone and solidification layers formed during the welding of alloy steels, to throw light on such problems as cracks in the weld metal and its mechanical properties.

1152 Methods of Studying the Primary Structure of Welds. A. A. Rossoshinskii. *Henry Brutcher Translation No.* 3992, 5 p. (From *Avtomaticheskaia Svarka*, v. 8, no. 4, 1955, p. 90-94.) Henry Brutcher, Altadena, Calif.

Description of a simple and reliable double-etch technique for revealing the primary structure of welds in low-carbon and low-alloy made by any welding process.

1153 Preparation of Microsections of Cemented Carbides Without Diamond Wheels. I. K. Trushin. *Henry Brutcher Translation No.* 4012, 4 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 7, 1956, p. 810-811.) Henry Brutcher, Altadena, Calif.

A procedure dispensing with diamond wheels entirely and consisting in rough grinding on wheels of green carborundum; grinding and finishing on wheels of electrically conducting abrasives, and etch polishing with Murakami's reagent, using alumina.

1154 Growth Conditions for Stability of a Cellular Solid-Liquid Interface. E. L. Holmes, J. W. Rutter, and W. C. Winegard. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1223-1227.

Samples of zone-refined Pb containing various amounts of Ag as solute were solidified under well-controlled conditions to study the transition from cellular to dendritic freezing as a function of composition, speed of freezing, temperature gradient in the melt during freezing, and crystallographic orientation of the solidfying crystal.

1155 The Constitution of Nickel-Gallium Alloys in the Region 0-35 Atomic % Gallium. W. B. Pearson and D. M. Rimek. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1228-1234 + 1 plate.

The equilibrium diagram of Ni-Ga alloys has been revised to include a newly discovered Ni_3Ga superlattice which forms peritectically at 1210 C. The new work shows that there is a very close resemblance between the Ni-Al and Ni-Ga systems in the Ni-rich region.

1156* (Russian.) Distribution of Small Quantities of Carbon in Iron Alloys. **Raspredelenie malykh kolichestv ugleroda v legirovannom zheleze.** A. S. Zav'ialov and B. I. Bruk. *Doklady Akademii Nauk SSSR*, v. 115, no. 1, July 1, 1957, p. 94-96 + 1 plate.

The redistribution of carbon in iron alloys was studied by the autoradiographic method by means of radioactive carbon C^{14}.

1157* (Russian.) New Types of Solid Solutions in High Titanium Slags. **Novye vidy tverdykh rastvorov v vysokotitanovykh shlakakh.** A. V. Rudneva, M. C. Model', and T. Ia. Malysheva. *Doklady Akademii Nauk SSSR*, v. 115, no. 1, July 1, 1957, p. 141-144 + 1 plate.

The following solid solutions were studied and their properties described: $2MgO \cdot TiO_2$-$2FeO \cdot TiO_2$, and (Fe, Mg, Mn) $O \cdot TiO_2$-Ti_2O_3.

1158* (Russian.) On the Mechanism Underlying the Influence of Surface Oxidation Upon the Graphitization of Iron Alloys. **O mekhanizme vliianiia poverkhaostnogo okisleniia na grafitizatsiiu zheleznykh splavov.** K. P. Bunin, G. Z. Koval'chuk, and S. A. Fedorova. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 281-283.

Study of the phenomenon in pearlitic iron, containing 2.80% C and 0.91% Si.

1159* (Russian.) Transformations in Ternary Solid Solutions Containing Ni_3MFe. **Prevrashcheniia v troinykh tverdkh rastvorakh na osnove Ni_3Fe.** M. P. Ravdel' and Ia. P. Selisskii. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 319-321.

The effect of Si, Cu, Mo, Cr, V, and W on ordering of Ni_3Fe alloys.

1160* (Russian.) Investigation of the Interior Adsorption of Carbon in α-Iron by Method of Internal Friction. **Issledovanie vnutrennei adsorbtsii ugleroda v α-zheleze metodom vnutrennego treniia.** Iun' Pao-tsui and Ke Tin-sui. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 407-416.

Study of behavior of C, adsorbed in intercrystalline zones and inside the grains. Structure and properties of adsorption zones.

1161* (Czech.) Structure Changes in Steel After Cold Working. **Změny struktury oceli po tváření za studena.** František Hrazdil. *Hutník*, v. 7, no. 9, Sept. 1957, p. 294-298.

Investigation of properties of cold-worked materials in relation to method and type of treatment. Hardness changes of low-carbon steels during cold stamping.

1162 The Effect of Stress on the Recrystallization of Lead During Creep. R. C. Gifkins. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 15-16.

The strain necessary to initiate recrystallization during the creep of high-purity Pb was determined for the range of stresses from 300 to 1500 lb./in.^{2} (with constant loads). The results appear to be best fitted by an exponential law, recrystallization occurring at higher strains with higher stresses. The grain-size after recrystallization becomes smaller with increased stress.

1163 Structural Changes Caused by Plastic Strain and by Fatigue in Aluminium-Zinc-Magnesium-Copper Alloys Corresponding to D.T.D. 683. T. Broom, J. A. Mazza, and V. N. Whittaker. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 17-23.

In alloys treated to have a U.T.S. of about 40 tons/in.^{2}, with an elongation of about 10%, catastrophic softening on certain planes can be observed in the late stages of both tensile and fatigue tests. This softening is associated with structural changes such that the planes can be revealed by etching polished sections from the interior of specimens. The planes are identified as those upon which extensive slip has occurred. Possible mechanisms for the formation of bands of heavy slip in fully hardened alloys are discussed.

1164 Dynamic Solution-Rate Studies of Solid Metals in Liquid Metals. A. G. Ward and J. W. Taylor. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 36-42.

Kinetics of solution of solid Cu in liquid Pb and Bi under dynamic conditions in the temperature range 360-460 C.

1165 Intermetallic Compounds Between Lithium and Lead. III. The β'-β Transition in LiPb. Allan Zalkin and William J. Ramsey. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1413-1415.

The high temperature β-phase of LiPb has the body-centered cubic CsCl structure, while the low temperature β-phase has a derivative rhombohedral structure.

1166 Phase Equilibria in the System Indium-Indium Phosphide. M. Shafer and K. Weiser. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1424-1426.

The system In-P was investigated in the composition range 0 to 55 mole % phosphorus. Liquidus and solidus curves were obtained by sealing mixtures in silica glass vials and observing a temperature break, due to the heat of reaction, by differential thermal analysis. The system is of the "monotectic" type in that the eutectic composition between In and InP was experimentally not detectable.

1167* An X-Ray Study of Textural Stresses in Two-Phase Alloys. C. J. Newton and H. C. Vacher. *Journal of Research, National Bureau of Standards*, v. 59, Oct. 1957, p. 239-243.

Internal or residual stresses, with special attention to that type resulting from a difference in thermal expansion of two phases present in an alloy were studied. X-ray stress measurements were made on various brasses and steels.

1168 Mechanism of the Diffusion of Hydrogen Through Active and Inactive Palladium. O. N. Salmon, D. Randall, and E. A. Wilk. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1674, Nov. 1956, 56 p. (UF767 Un3.1ka Contin.)

Development of a diffusion equation. Experiments through flat Pb membranes, 0.0025 to 0.020 in. thick, at upstream H pressure up to 50 cm. Hg and at essentially zero downstream H pressure, and at a membrane temperature of 300 to 600 C.

1169* (Russian.) Microstructural Study of the Disintegration of the Supercooled Austenite in Magnesium Cast Iron Containing Granular Graphite. **Mikrostrukturnoe izuchenie raspada pereokhlazhdennogo austenita v magnievom chugune s sharovidnym grafitom.** D. Sh. Frolov and A. N. Mirza. *Metallovedenie i Obrabotka Metallov*, 1957, no. 9, Sept., p. 4-9.

Three zones of transformation were observed during the disintegration of the supercooled austenite: pearlite (at 600 C and higher), intermediate (at 250 to 550 C), and martensite (below 250 C). Each zone was studied separately.

1170* (Russian.) Pearlite Transformation in Chromium Steel Containing Niobium and Zirconium. **Perlitnoe prevrashchenie v khromistoi stali, soderzhashchei niobii i tsirkonii.** D. Ia. Vishniakov and L. S. Ol'khovoi. *Metallovedenie i Obrabotka Metallov*, 1957, no. 9, Sept., p. 18-21.

Study of two steels, one containing 0.35 C, 0.3 Mn, 0.28 Si, 2.15 Cr, 0.25 Nb, 0.007 S, and 0.03 P; and the other 0.37 C, 0.51 Mn, 0.25 Si, 2.07 Cr, 0.05 Zr, 0.017 S, and 0.016% P.

1171* (Russian.) The Effect of Induction Heating Parameters on the Austenite Grain Size in Nickel Steels. **Vliianie parametrov induktsionnogo nagreva na velichinu zeren austenita nikelevoi stali.** I. N. Kidin. *Metallovedenie i Obrabotka Metallov*, 1957, no. 9, Sept., p. 36-42.

Data are given for 20 types of Ni steels.

1172 Bonding in Metals. Roland Kiessling. *Metallurgical Reviews*, v. 2, no. 5, 1957, p. 77-107.

The electron theory of metals, together with the Brillouin-zone theory, makes possible an understanding of many of the physical properties usually associated with the metallic state. The bonding is effected by the valency electrons, which belong to the structure as a whole and not to individual atoms. The bonding forces should be expressed in terms of energy. Detailed studies of the interatomic distances in many metals and alloys have shown that in metallic structures localized bonds, probably of a covalent nature, often exist between certain atoms in the structure. This is shown by bond lengths between these atoms being shorter than those between the other atoms in the structure or by unsymmetrical structure properties.

1173 The Scaling of Billets. J. Moreau and M. Cagnet. *Metal Treatment and Drop Forging*, v. 24, Sept. 1957, p. 362-366.

Structure and composition of scales on mild and medium-carbon steels. (To be continued.)

1174* (German.) High-Temperature Microscopy. **Die Hochtemperaturmikroskopie.** Přemysl Ryš. *Neue Hütte*, v. 2, Aug. 1957, p. 489-497.

The high-temperature microscope. Principles of high-temperature structural investigations. Grain boundary furrow formation. Austenite grain growth. Determination of austenite grain size. Graphite layers. Deformations of the polished surface.

1175 The Uranium-Silicon Epsilon Phase. S. Isserow. *Nuclear Metals, Inc. (U. S. Atomic Energy Commission)*, NMI-1160, Sept. 1956, 15 p. (UF767 Un3.1nm Contin.)

The most recent research has been concentrated on overcoming two drawbacks of this alloy: its narrow composition range and its interaction with Zircaloy during coextrusion. These drawbacks need not prevent consideration of this alloy as the core material for fuel elements.

1176 The Texture of Drawn Tungsten Wires. G. D. Rieck. *Philips Research Reports*, v. 12, Oct. 1957, p. 423-431.

X-ray diffraction measurements show that the wire has the generally accepted normal fiber texture with a random orientation of the crystals around the [110] fiber axis.

1177 Liquid⇆Solid Equilibrium in Copper and Silver Alloys, With an Appendix on the Equilibrium Diagram of the System Copper-Arsenic. William Hume-Rothery and Jennifer Burns. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1177-1196.

Liquidus and solidus curves for the α-solid solutions of Cd, In, Sn, and Sb in Ag, and of Zn, Ga, Ge, and As in Cu.

1178 The Centre of a Dislocation. I. Elizabeth H. Yoffe. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1197-1210.

The simple edge dislocation is presented as the difference of two or more dislocations of the more general type. By this means it is possible to eliminate the central singularity hitherto obtained in the elastic dislocation, to calculate the stresses at all points, and to plot the law of force acting across the slip plane.

1179 Electrostatic Fields Round Localized Defects in Metals. P. M. Lee and N. H. March. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1226-1236.

The present approach should provide a first approximation for foreign atoms entering substitutionally in the lattice, and for vacancies. Method is illustrated by studying numerically the case of a vacancy in Cu.

1180 Helical Dislocations and Spiral Etch-Pits. S. Amelinckx, W. Bontinck, and W. Dekeyser. *Philosophical Magazine*, v. 2, ser. 8, Oct. 1957, p. 1264-1270.

Under certain conditions the etching of a helical dislocation gives rise to a spiral etch-pit of the kind observed on Ge and Si crystals. Etch-patterns on (111) faces of fluorite crystals containing helical dislocations can readily be interpreted on the same basis.

1181 Quenched-In Lattice Defects in Gold. J. E. Bauerle and J. S. Koehler. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1493-1498.

Studies on high-purity Au wires of 16- and 30-mil diameters which were heated to temperatures in the range from 450 to 1000 C and then quenched to room temperature in water.

1182 Interpretation of the Quenching Experiments on Gold. J. S. Koehler, F. Seitz, and J. E. Bauerle. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1499-1505.

The behavior of vacancies in Au during quenching is treated theoretically under the assumption that the total number is conserved, although they may aggregate into pairs and triplets. Approximate solutions of the equations governing the abundance of isolated vacancies is obtained in the case in which only a small fraction aggregate, that is, in the limiting case in which the quench is very rapid.

1183* (English.) **On the Twin Structure of Nickel Films Electrodeposited on Single Crystals of Copper.** Shiro Ogawa, Joji Mizuno, Denjiro Watanabe, and F. Eiichi Fujita. *Physical Society of Japan, Journal*, v. 12, Sept. 1957, p. 999-1006.

In films deposited on electropolished surfaces well marked {111} twin lamellae were observed and their directions satisfied the crystallographic relation. They were scatteringly located and their width ranged from less than 100 to several thousand Å. The twin structures of films deposited on etched faces are very fine and similar to evaporated films in width as well as spacing.

1184* (French.) A Contribution to the Study of the Kinetics of White Iron Graphitization. **Contribution à l'étude de la cinétique de la graphitisation des fontes blanches.** M. Ferry. *Revue de Métallurgie*, v. 54, Aug. 1957, p. 586-596.

Graphitization rate is probably controlled by a diffusion phenomenon. Effect of annealing temperature and the duration of treatment on the number of nodules.

1185* (French.) Study of Intermetallic Diffusion Processes in the Uranium-Zirconium System. **Étude des phénomènes de diffusion intermétallique dans le système uranium-zirconium.** Y. Adda, J. Philibert, and H. Faraggi. *Revue de Métallurgie*, v. 54, Aug. 1957, p. 597-610.

Diffusion was studied by means of micrography, autoradiography, and the electron probe microanalyzer. Concentration-penetration curves in the 950-1075 C range were established for the γ (body centered cubic) phase. Diffusion coefficients, activation energy, and frequency factor vary strongly with concentration.

1186* (French.) Improvement in the Knowledge of Ferro-Chromium Inclusions. **Progrès dans la connaissance des inclusions du ferro-chrome.** R. Zoja. *Revue de Métallurgie*, v. 54, Aug. 1957, p. 617-622.

The TTT curves of decomposition of the internal constituent of characteristic inclusions in ferrochromium were established. A definite classification of all the inclusions was obtained.

1187* (French.) Recovery and Recrystallization of Commercial Titanium Sheets. **Adoucissement et recristallisation des tôles de titane commercial.** A. Saulnier and R. Develay. *Revue de Métallurgie*, v. 54, Sept. 1957, p. 689-699.

Annealing of cold worked Ti sheets involves important alterations of the mechanical characteristics, before any recrystallization is revealed by the classical micrographic methods and Debye-Scherrer diagrams. The electron microscope connects this recovery with the development of a cellular structure in the cold worked matrix. Recrystallization is obtained at about 600 C for light cold working and at about 550 C for extensive cold working.

1188* (German.) Effects of Different Quenching Media on the Structure of Chrome-Molybdenum Steel Forgings 200 mm. in Diameter. **Die Wirkung verschiedener Ablöschmittel auf die Gefügeausbildung von Schmiedestücken mit 200 mm. Durchmesser aus Chrom-Molybdän-Stahl.** A. Sponheuer and H. J. Fischer. *Technische Mitteilungen Krupp*, v. 15, Sept. 1957, p. 87-94.

Hardening and structural formation of 16 Cr-44 Mo, 22 Cr-4 Mo, and 42 Cr-4 Mo steels after quenching and tempering. Water had a more penetrating effect than oil. Possible improvement of the quenching capacity of mineral oils.

1189* (German.) Electron Microscope Examination of the Formation of Slip Bands on Copper Single Crystals. **Elektronenmikroskopische Untersuchung der Gleitlinienbildung auf Kupfereinkristallen.** Siegfried Mader. *Zeitschrift für Physik*, v. 149, no. 1, 1957, p. 73-102.

Determination of plastic stress-strain curves. Theoretical explanation of band formation with 12- and 20-atom intervals according to the amount of deformation. Application to surface phenomena.

1190* (Russian.) Studying the Silver-Platinum System. **Issledovanie sistemy serebro-platina.** O. A. Novikova and A. A. Rudnitskii. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 8, Aug. 1957, p. 1840-1847 + 2 plates.

Hardness, electrical resistance, temperature coefficient, thermoelectromotive force, microstructure, and X-ray analysis of various phases.

1191* (Russian.) Diffusion and Solubility of Silver in Germanium. **Diffuziia i rastvorimost' serebra v germanii.** A. A. Bugai, V. E. Kosenko, and E. G. Miseliuk. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1671-1675.

Investigation of solubility and diffusion of Ag in Ge using radioactive indicators. Obtained results are compared with the Wert and Ziner theory of diffusion.

1192* (Russian.) A Note on the Calculation of the Simple Equilibrium Diagrams of Ternary Alloys. **K raschetu prosteishikh diagramm ravnovesiia troinykh splavov. II.** Some Solutions of General Equations for the Case of Decomposition of Solutions Associated With a Phase Transition. **Nekotorye resheniia obshchikh uravnenii dlia sluchaia raspada rastvorov idushchego s fazovym perekhodom.** B. Ia. Pines. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1886-1892.

Analysis of two-phase equilibrium in ternary alloys.

1193* (Russian.) X-Ray Study of Distortions in the Crystal Lattice of Aluminum Deformed at the Temperature of Boiling Nitrogen. **Rentgenograficheskoe izuchenie iskazhenii v kristallicheskoi reshetke aliuminiia, deformirovannogo pri temperature kipeniia azota.** S. O. Tsobkallo and B. I. Smirnov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1912-1914.

Investigation of metal deformation at very low temperatures in order to check physical theories of strengthening, and to study the nature of cold brittleness, the production of stronger structures by cold hardening, and the effect of deformation temperature on kinetics of relaxation processes.

1194* (Slovakian.) Chemical Polishing of Welded and Soldered Joints in Light Metals for Metallographic Purposes. **Chemické leštenie zváraných a spájkovaných spojov, farebných a ľahkých kovov pre metalografické účely.** Pavel Slyško. *Zvaránie*, v. 6, no. 9, Sept. 1957, p. 270-275.

Chemical polishing has its advantages and disadvantages like mechanical and electrolytic polishing and hence will not displace these methods.

See also: **182** (etching by ion bombardment); **923** (vacuum technology in metallurgy); **979** (solidification and crystallization in continuous casting); **1066** (microstructure of carbon steels); **1071** (aging of sheet steel).

METALS—POWDER

1195 The Preparation and Magnetic Properties of High Purity Raney Iron. W. D. Johnston, R. R. Heikes, and J. Petrolo. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5388-5391.

Raney method yields Fe powder of relatively high purity (95% Fe) and high coercive force (about 560 oe.)

1196* (Russian.) Relationships in Pressing and Sintering of Powder Metal Compositions With Copper Base. **Zakonomernosti pressovaniia i spekaniia metallokeramicheskikh kompozitsii na mednoi osnove.** T. N. Znatokova and V. I. Likhtman. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 511-518 + 1 plate.

Investigation of mixtures Cu-graphite, Cu-Sn, and Cu-Sn-graphite. Structural transformations during sintering of Cu-Sn mixtures.

1197 Some Experiments on the Extrusion of Magnesium and Aluminium Powders. H. G. Cole. *Institute of Metals, Journal*, v. 86, Sept. 1957, p. 29-35.

Smooth extrusions of good mechanical properties can be made from Mg powders at low extrusion speeds provided that the billet temperature exceeds 470 C. Alloy extrusions containing extra dispersed oxide can be made by extruding reactive mixtures of a metal powder with a metal-oxide powder.

1198* (German.) Production Problems of Metal Powders Designed for the Manufacture of Machine and Instrument Parts. **Probleme der Gewinnung von Metallpulvern zur Herstellung von Maschinen- und Geräteteilen.** Friedrich Eisenkolb. *Neue Hütte*, v. 2, Aug. 1957, p. 461-470.

Powder production in general. Fields of application. Production processes for iron, non-ferrous metal, and light metal powder. Metal powder tests. Preparation for pressing. Metal powder for the production of sintered steels and sintered alloys. Preparation of superfine powders and powders having special particle shapes.

1199* (German.) Production and Testing of Sintered Bodies Made of Alumina and Chromium. **Herstellung und Prüfung von Sinterkörpern aus Aluminiumoxyd und Chrom.** Friedrich Eisenkolb and Werner Schatt. *Neue Hütte*, v. 2, Aug. 1957, p. 471-481.

Pretreatment and pressing of the powder mixtures. Sintering treatment. Hardness, specific gravity, flexural breaking strength, and tensile strength of the sintered bodies. Influence of additions. Non-scaling and electric resistance tests.

1200* (German.) Some Experiences With the Sintering of Metals in High Vacuum. **Einige Erfahrungen über das Sintern von Metallen im Hochvakuum.** Milan Mamula. *Neue Hütte*, v. 2, Aug. 1957, p. 497-502.

1201 Vacuum Sintering. I. Theory and Practice. Henry H. Hausner. *Precision Metal Molding*, v. 15, Oct. 1957, p. 44 + 3 pages.

Vacuum sintering of Cu is used as an example.

1202* (Russian.) The Effect of Electrolyte Mixing on the Electrolytic Precipitation of Powdered Copper. **O vliianii peremeshivaniia elektrolita na elektroliticheskoe osazhdenie poroshkoobraznoi medi.** A. V. Pomosov and V. A. Branshtein. *Zhurnal Prikladnoi Khimii*, v. 30, no. 8, Aug. 1957, p. 1255-1258.

With increased intensity of mixing, the dispersion and dendritic structure of powdered Cu decrease, and the specific volume increases. By the regulation of the intensity of mixing, it is possible to get electrolytic powder with standard physical properties.

1203* (Russian.) Sintering of Non-Single-Phase Bodies. **Spekanie neodnofaznykh tel. III.** Sintering of Mixtures Containing Low-Melting Components. **Spekanie smesei soderzhashchikh legkoplavkie komponenty.** B. Ia. Pines, A. F. Sirenko, and N. I. Sukhinin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1893-1903 + 1 plate.

Effect of initial porosity in mixtures containing low-melting additions on sintering properties. Sintering of mixtures of Cu powder with additions of Pb, Sn, Bi, and Cd.

1204* (Russian.) Some Regularities of Mechanical Strength of Bodies Prepared by Sintering Metal Powders. **Nekotorye zakonomernosti mekhanicheskoi prochnosti u tel, polu-chennykh spekaniem poroshkov metallov. III.** The Case of Powder Mixtures Containing Low-Melting Components. **Sluchai, kogda smesi poroshkov soderzhat legkoplavkie komponenty.** B. Ia. Pines, A. F. Sirenko, and N. I. Sukhinin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1904-1911.

Investigation of the relationships between mechanical strength, final porosity, average grain size, and duration of heating Cu powder compacts.

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

1205* (Russian.) Safety Measures in Checking Metals With Gamma Rays. **Voprosy bezopasnosti pri prosvechivanii metallov gamma-luchami.** V. S. Sokolov. *Bezopasnost' Truda v Promyshlennost'*, v. 1, no. 9, Sept. 1957, p. 17-20.

List of precautions which should be taken in dealing with γ-rays.

1206* Application of X-Ray Image Intensification to Industrial Problems. A. Nemet and A. Hewett-Emmett. *British Institution of Radio Engineers, Journal*, v. 17, Sept. 1957, p. 523-527.

Improvements in resolution that can be achieved with the X-ray image intensifier compared with conventional fluoroscopic methods. Industrial applications in which the intensifier has been successfully used include examination of engineering stores in their packages, continuous weld examination of pipelines, and inspection of castings and reactor fuel elements.

1207 Inspection of Chromium Plates for Porosity. A. A. Polyakov and D. N. Garkunov. *Henry Brutcher Translation No. 4026*, 4 p. (From *Zavodskaia Laboratoriia*, v. 22, no. 4, 1956, p. 482-484.) Henry Brutcher, Altadena, Calif.

Description of an apparatus which fits inside a cylinder enables the inner surface to be examined under a microscope. The Cr deposit within the field of view is then checked against a standard photograph showing the most desirable pattern of porosity.

1208 Semi-Automatic Ultrasonic Flaw Detector. *Machinery Lloyd (Overseas Ed.)*, v. 29, Sept. 14, 1957, p. 75.

1209 New Comparator for Measuring Pitch Errors of Fir-Tree Root Serrations in Gas Turbine Discs. L. W. Nickols. *Machinery (London)*, v. 91, Sept. 20, 1957, p. 707-712.

1210* (German.) Nondestructive Testing of Metallic Materials by Electro-Magnetic Induction Treatment. **Die zerstörungsfreie Prüfung von metallischen Werkstoffen mit elektromagnetischen Induktionsverfahren.** F. Förster. *Metall*, v. 11, Oct. 1957, p. 837-846.

Theoretical and experimental study of the eddy current test. Several industrial testing methods.

1211 Advances in Nondestructive Test Methods. *Metal Progress*, v. 72, Oct. 1957, p. 143 + 3 pages.

Latest devices in the field are outlined, together with "Photostress", where surface stresses are estimated from the reflections of polarized light from a plastic sheet cemented to the part.

1212* The Basis for Optimum-Test-Methods Selection. J. Thewlis. *Nondestructive Testing*, v. 15, July-Aug. 1957, p. 210-216.

A scheme is described, based on the preparation of two sets of cards, one relating to the techniques used for, and the other to the problems encountered in, nondestructive testing, by the use of which the choice of a suitable technique for a particular problem is facilitated.

1213* Accelerated Life Tests. Harry G. Romig. *Nondestructive Testing*, v. 15, July-Aug. 1957, p. 224-228.

Current stress on reliability requires accurate predictions of service life and of shelf life of materials and components. Life tests, accelerated life tests, and methods of statistical analysis are discussed.

1214* Advantages and Limits of Nondestructive Testing. H. Krainer. *Nondestructive Testing*, v. 15, July-Aug. 1957, p. 234-240.

A general review of factors to be considered when selecting a nondestructive testing method. Importance of economic factors in wise selection is emphasized.

1215* Uses of Statistical Methods for Ultrasonic Inspection Problems. M. J. Bratt. *Nondestructive Testing*, v. 15, Sept.-Oct. 1957, p. 282-287.

Examples illustrate the use of statistical methods in analyzing typical test problems. Shows that statistical methods can be an invaluable analytical tool.

1216* SNT Airframe Committee Report on Reproducibility of Ultrasonic Inspection Test Results. Z. J. Varney and R. E. Kleint. *Nondestructive Testing*, v. 15, Sept.-Oct. 1957, p. 290-292.

Comparison of test reports on standard samples of wrought Al alloys. Indicates a significant reliability and reproducibility of ultrasonic inspection results.

1217 Nondestructive Testing of Reactor Components. Warren J. McGonnagle. *Nucleonics*, v. 15, Oct. 1957, p. 78-81.

Radiography; thermal, penetrant, electrical resistance, eddy-current and ultrasonic tests. Leak testing.

1218* Testing of Petroleum Equipment. Review of Non-Destructive Methods. W. E. Schall. *Petroleum*, v. 20, Oct. 1957, p. 377-380.

Principally concerned with X-ray and ultrasonic techniques.

1219 Nondestructive Thickness Measurement of Anodizing Using the Interference Microscope. Roger L. Saur. *Plating*, v. 44, Oct. 1957, p. 1079-1082.

The interference microscope is used to measure transparent anodic film thickness on Al and Al alloys in the range 0.00005 to 0.0008 in. with an accuracy of about ±0.00002-in. The method is fast, absolute, and nondestructive.

1220* (French.) Cesium-137 in Gamma Radiography. Intensifying Effect of Lead Screens. **Contribution à l'étude des possibilités d'utilisation en gammagraphie du radioisotope césium 137. Étude de l'effet renforçateur des écrans au plomb.** Albert Blondel and Pierre Broquet. *Revue de Métallurgie*, v. 54, Sept. 1957, p. 700-706.

The radiation energy (0.66 m.e.v.) of Cs-137 makes it quite suitable for radiographic inspection of steel and cast iron castings ranging from 20 to 100 mm. thick, and its long half-life of 33 yrs. proves useful in industrial applications. The best screen combination is offered by a 0.15 mm. thick front screen and a 0.20 mm. back screen.

See also: **24** (inspection of aerodynamic models); **1514** (weld inspection with magnetic tape).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

1221 Conceptual Design of an Advanced Engineering Test Reactor. R. G. Mallon, J. Saldick, and R. E. Gibbons. *Advanced Scientific Techniques Research Associates (U. S. Atomic Energy Commission)*, NYO-4849, Mar. 1957, 124 p. (UF767 U3ny Contin.)

Reactor is a large graphite assembly penetrated by parallel Zircaloy tubes through which flows a heavy water solution of uranyl sulfate. Reactor power is 220 megawatts.

1222* Water Supply and Drainage Quantities for Radioactivity Laboratories. John M. Ruddy. *Air Conditioning, Heating, and Ventilating*, v. 54, Oct. 1957, p. 105-106.

Design data for hot and cold water piping, laboratory waste piping, and sampling and holdup tank sizing.

1223* (German.) Nuclear Processes in Uranium Ores. **Kernprozesse in Uranerzen.** Wolfgang Burkhardt. *Annalen der Physik*, v. 20, nos. 1-6, 1957, p. 184-209.

Deviations in U pitchblendes. Neutron-induced fission together with spontaneous fission; Pu^{239} content; isotope concentration. Measuring the shifts in the proportions of isotopic abundance.

1224* (German.) The Irradiation Output of Radioactive Isotopes. **Die Durchstrahlungsleistung von radioaktiven Isotopen.** Hermann Möller and Helmut Weeber. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 543-546.

Comparative irradiation tests with Ir-192, Cs-137, and Co-60.

1225* (English.) **Photodisintegration of Oxygen.** Sven A. E. Johansson and Bengt Forkman. *Arkiv för Fysik*, v. 12, no. 4, 1957, p. 359-380.

The (γ,p) and (γ,α) reactions in O^{16} were studied.

1226* (German.) Concrete in Radiation Shielding Techniques. **Beton in der Strahlenschutztechnik.** Thomas Jaeger. *Atomkernenergie*, v. 2, July 1957, p. 255-262.

Narrow and wide radiation beams; energy absorption; lead equivalent; reciprocal action between neutrons and various materials; elastic and inelastic scattering; neutron capture. Computation of radiation attenuation.

1227* (Russian.) Investigation of the γ-Rays Emitted by the Nuclei of Vanadium, Manganese, Cobalt, and Aluminum on Capturing Thermal Neutrons. **Issledovanie γ-luchei, ispuskaemykh iadrami vanadiia, margantsa, kobal'ta i aliuminiia pri zakhvate teplovykh neitronov.** L. V. Groshev, A. M. Demidov, V. N. Lutsenko, and V. I. Pelekhov. *Atomnaia Energiia*, v. 3, no. 9, Sept. 1957, p. 187-203.

Energy and intensity of the γ-rays emitted by the nuclei were measured with the magnetic spectrometer.

1228* (Russian.) The Li(p,n)Be Reaction and the Fundamental Structure of the Be Nucleus. **Reaktsiia (p,n) na litii i osnovnoe sostoianie iadra Be.** G. F. Bogdanov, N. A. Vlasov, S. P. Kalinin, B. V. Rybakov, and V. A. Sidorov. *Atomnaia Energiia*, v. 3, no. 9, Sept. 1957, p. 204-210.

The neutron spectra of the $Li^6 + p$ and $Li^7 + p$ reactions with 9 m.e.v. protons were studied. The existence of the Be^6 nucleus was proved experimentally with the detection of the group of neutrons of the Li^6 (p,n) Be^6 reaction. The energy of this reaction was 5.2 m.e.v.

1229* (Russian.) The Separation of Germanium and Magnesium Isotopes in a Small Electro-Magnetic Separator. **Razdelenie izotopov germaniia i magniia v malom elektromagnitnom separatore.** V. M. Gusev, D. V. Chkuaseli, and M. I. Guseva. *Atomnaia Energiia*, v. 3, no. 9, Sept. 1957, p. 215-221.

Method of separation is described, as well as the construction of the isotope receiver and ionic source. Metallic samples were used in case of Ge, and MgI_2 in case of Mg.

1230* (Russian.) Atomic Engines for Ships. **Atomnye dvigateli na sudakh.** V. V. Lakhanin. *Atomnaia Energiia*, v. 3, no. 9, Sept. 1957, p. 222-226.

Discussion of the future possibilities for atom-driven engines for ships; U.S.A. as well as Soviet projects are discussed.

1231 Scandium Isotope of Mass 42. J. A. R. Cloutier and A. Henrikson. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1190-1198.

A member of the odd-odd Z=N family, Sc^{42} has been produced by proton bombardment of a Ca target greatly enriched in Ca^{42}. The positron emission, which alone is observed, has a measured half-life of 0.68 sec., end point 4.8 m.e.v., and threshold 6.8 m.e.v.

1232 Time Reversal Effects in Muon Decay. Robert T. Sharp and Glen Bach. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1199-1203.

Expressions are given for the distribution of electrons emitted in the decay of aligned muons as a function of their energy, direction, and spin. The two-component neutrino theory of Yang and Lee is used, and two cases are considered: neutrino and antineutrino emitted; two neutrinos emitted.

1233 Reactor Neutron Capture Cross Section of 51-Day Sr^{89}. L. P. Roy and J. C. Roy. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1215-1219.

Using an activation method, the capture cross sections of Sr^{89} for reactor spectrum neutrons was found to be 0.49 ± 0.10 barn.

1234* (German.) The Catalytic Nuclear Reaction. **Die katalytische Kernreaktion.** P. Erdos. *Chimia (Switzerland)*, v. 11, Sept. 1957, p. 272-276.

A new atomic reaction: "catalytic nuclear fusion". A proton is fused with a deuteron to form a He nucleus. Description of production of energy and a meson during the reaction. Observation in a bubble chamber.

1235 Some Operational Problems of the Nuclear Power Plant. A. R. Jones and R. L. Witzke. *Communication and Electronics*, 1957, no. 32, Sept., p. 373-377.

Start-up, normal operation, shutdown, maintenance, refueling, and manpower requirements for the pressurized water reactor.

1236 Radiation - Flux Conditions in Radioactive Media With Applications to Radiation Monitoring. Bjorn E. Dahlin. *Communication and Electronics*, 1957, no. 32, Sept., p. 391-396.

1237 Electrical Problems in Electrical Burn-Out Testing of Nuclear Fuel Elements. T. W. Hunt. *Communication and Electronics*, 1957, no. 32, Sept., p. 400-406.

Describes the electric equipment used in a burn-out test facility and discusses solutions to various problems that arose during the test program.

1238 A Wire-Activation Technique for Reactor-Flux-Profile Measurements. Alton E. Klickman and Francis R. DeFalco. *Communication and Electronics*, 1957, no. 32, Sept., p. 428-430.

The application of the wire-activation technique was extended so that flux profiles could be obtained in the cores of pressurized water-type reactors. Tests with Mg with 0.01 at.% In and 0.010-in. in diameter, showed that the method is feasible and the counting rates are high enough to give reliable results.

1239* (French.) Measuring the Elastic Diffusion of 1.12 MeV Gamma Rays in Lead. **Mesure de la diffusion élastique des rayons γ de 1,12 MeV dans le plomb.** Eiichi Hara, Jean Banaigs, and Eugène Alexandre. *Comptes Rendus*, v. 245, Sept. 9, 1957, p. 963-965.

The elastic diffusion of the γ-rays of ^{65}Zn in lead were measured. The results agreed much with the semi-empirical calculations of Rayleigh and Thomson. The disagreement between the values for 1.12 m.e.v. of ^{65}Zn and those for 1.17 m.e.v. of ^{60}Co could be due to the inelastic diffusion of the γ-rays of 1.33 m.e.v. of ^{60}Co due to the electrons attached to the nucleus.

1240 Controlled Thermonuclear Reactions. *Controlled Thermonuclear Branch, Division of Research (U. S. Atomic Energy Commission)*, TID-7536, pt. 1, Sept. 1957, 41 p. (UF767 Un3ti Contin.)

Eleven papers presented at a conference on controlled thermonuclear reactions including AEC personnel, personnel of AEC contractors, access permittees, and representatives of United Kingdom Atomic Energy Authority.

1241 Compilation of Organic Moderator and Coolant Technology. II. Harry P. Smith. *Division of Reactor Development (U. S. Atomic Energy Commission)*, TID-7007 (Del.), Jan. 1957, 420 p. (UF767 Un3ti Contin.)

Papers are largely concerned with the radiation stability of organic fluids and associated reactor technology.

1242 Nuclear Powered Ships for American Ship Operators. A Symposium Held at Washington, D. C. July 30, 1957. *Division of Reactor Development (U. S. Atomic Energy Commission)*, TID-7539, Sept. 1957, 190 p. (UF767 Un3ti Contin.)

Fifteen papers on ship design and problems of nuclear propulsion.

1243* (Russian.) Separation of Isotopes When an Atomic Beam Passes Through an Ionization Space. **Razdelenie izotopov pri prokhozhdenii atomnogo puchka cherez prostranstvo ionizatsii.** K. D. Sinel'nikov, B. G. Safronov, G. G. Aseev, and Iu. S. Asovskii. *Doklady Akademii Nauk, SSSR*, v. 115, no. 1, July 1, 1957, p. 80-83.

Studying the possibility of isotope separation; description of the method and equipment used in experiments.

1244* (Russian.) The Cross Section for Inelastic Interaction of More-Than-7-Bev Kinetic-Energy Protons With Nuclei of Carbon Atoms. **Sechenie neuprugogo vzaimodeistviia protonov s kineticheskoi energiei bol'she 7 bev s atomnymi iadrami ugleroda.** K. I. Alekseeva and N. L. Grigorov. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 259-262.

Measurements of cross sections for interaction of 12 Bev protons with carbon nuclei in the stratosphere at 31°N geomagnetic latitude.

1245 Operating the Hanford Reactors. D. S. Lewis. *Electrical Engineering*, v. 76, Nov. 1957, p. 951-956.

Personnel requirements, operating procedures, and maintenance problems.

1246 Blazing Trails With the Peaceful Atom. *Florida Engineering and Industrial Experiment Station, Bulletin No. 88*, v. 11, May 1957, 44 p. (TA1 F66b Contin.)

A compilation of papers pertaining to Florida's development of atomic energy. Includes papers on reactor instrumentation, microscopy in radioactive waste treatment by dilution, and the γ-ray densitometer and concentration meter.

1247 Re-Evaluation of Graphite Diffusion Lengths. M. T. Lee. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51175, June 1957, 22 p. (UF767 Un3.1hw Contin.)

The measured values of diffusion length in five Hanford Production Pile moderators and of the Standard Pile, a graphite stack, were corrected for neutron absorption in the Al process tubes, atmospheric N in the machined openings of the pile, N in the graphite pores, for neutron streaming in voids, and for density of the graphite, to reduce them to diffusion lengths of equivalent solid stacks of graphite of 1.6 gm/cc density for comparison purposes, the average value being 52.19 cm.

1248 The Dependence of Thermal Stresses in Cylindrical Reactor Fuel Elements Upon the Method of Cooling. K. R. Merckx. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-50364, July 1957, 25 p. (UF767 Un3.1hw Contin.)

Thermal stresses and strains are determined with a method of analysis which uses a material model relating the strain rate, temperature, strain, and stress. Solid and hollow cylindrical fuel elements internally, externally, and internally-externally cooled operating in the temperature ranges of 200 to 600 C are used as numerical examples.

1249* A Cyclotron for Medical Research. J. W. Gallop, et al. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Sept. 1957, p. 452-466.

Details of machine designed to maintain an output of 200μ A of 15 m.e.v. deuterons in an external beam under routine operating conditions.

1250* Nuclear Power for the Propulsion of Merchant Ships. S. L. Smith and J. E. Richards. *Institution of Engineers & Shipbuilders in Scotland, Transactions*, v. 100, pt. 7, 1956-1957, p. 698-744.

A study of the permissible cost of a 47,000-ton tanker. Engineering problems and safety precautions.

1251* (Russian.) Positrons in the Radiation of the Radioactive Isotope In^{114}. **Pozitrony v izluchenii radioaktivnogo izotopa In^{114}.** B. S. Dzhelepov, O. E. Kraft, and V. B. Zhinkina. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 7, July 1957, p. 978-984.

Studies of the competing $\beta+-\beta$-disintegration of In^{114}, which has two isomers with disintegration periods of 50 days and 72 sec.

1252 Characteristics of Plastic Scintillators. Louis J. Basile. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 801-806.

The primary solutes studied are *p*-terphenyl and 2-phenyl-5-(4-biphenylyl)-1,3,4 oxadiazole (PBD), the latter being the most efficient. Of the secondary solutes studied, 4,4'-diphenylstilbene and 2,5-dibiphenylyl oxazole are the most efficient. The best plastic scintillator developed contains a combination of PBD and 4,4'-diphenylstilbene.

1253 Some Derivatives of Aza-Aromatic Heterocycles as Liquid Scintillator Solutes. Henry Gilman, Eugene A. Weipert, Theodore Soddy, and F. Newton Hayes. *Journal of Organic Chemistry*, v. 22, Oct. 1957, p. 1169-1171.

This heterocycle appears to be less effective than other N heterocycles. Responses for 45 derivatives are rated.

1254 An Ionization Chamber for the Study of Plutonium Hexafluoride. J. W. Codding, Jr. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1759, Mar. 1957, 23 p. (UF767 Un3.1ka Contin.)

Calibration data for a metal-ceramic ionization chamber for use with PuF_6 and nonradioactive gases in the pressure range from 0.1 to 100 mm. of Hg. Effects of secondary ionization and recombination on ion current.

1255* (Russian.) Investigation of Back-Scattering of Gamma-Radiation. **Issledovanie obratnorasseiannogo gamma-izlucheniia.** N. Dubinskaia and U. Ulmanis. *Latvijas PSR Zinātnu Akademija Vestis*, 1957, no. 7, p. 147-150.

Determination of the intensity of back-scattering of γ radiation depending on the at. no. of the scatterer. With an increase of at. no. the possibility of Compton scattering and photoelectric absorption increases.

1256 Atomic Fuels. Frank H. Spedding. *Metal Progress*, v. 72, Oct. 1957, p. 105-111.

Fissionable isotopes available to fuel the future power reactors could be used as solid metal or alloy, as a molten mixture, or in liquid solution.

1257* Remote Handling. IV. Shielding Systems. R. A. G. Welsher. *Nuclear Engineering*, v. 2, Oct. 1957, p. 427-430.

Comparison of the various types of material for shielding against high-energy radiation.

1258* The Classification of States of Surface Vibrations. G. Rakavy. *Nuclear Physics*, v. 4, Sept. 1957, p. 289-294.

The classification of surface oscillations is improved by introducing an additional quantum number which is specially suitable for the treatment of "γ-unstable oscillations". A selection rule implied by this quantum number is discussed.

1259* Low Lying Levels in Th^{226}. S. Bjørnholm, O. Nathan, O. B. Nielsen, and R. K. Sheline. *Nuclear Physics*, v. 4, Sept. 1957, p. 313-324.

1260* The Decay of ^{109}Cd, ^{109}Ag and ^{109}Pd. A. H. Wapstra and W. Van Der Eijk. *Nuclear Physics*, v. 4, Sept. 1957, p. 325-329.

The K conversion coefficient of the 88 k.e.v. E3 γ-ray in ^{109}Ag is found to be 10.3 ± 0.5. The electron capture decay energy of ^{109}Cd to a level of about 75 k.e.v. is obtained from the ratio of K and L capture. Gamma rays of 305 and 410 k.e.v. which could originate from known levels at these energies in ^{109}Ag occur for 0.07 and $<0.03\%$ per decay of ^{109}Pd.

1261* On the Theory of Scattering Measurements in Nuclear Emulsion. I. The Distribution Functions of the Coordinate Differences. N. Solntseff. *Nuclear Physics*, v. 4, Sept. 1957, p. 337-362.

Molière's theory of multiple scattering measurements in nuclear emulsion is treated in a mathematically simpler way. The distribution functions of the second, third, and fourth differences of coordinates arising from true scattering and noise are derived for the constant-cell method.

1262* Rotational Spectra of Nuclei Following O^{16}. G. Rakavy. *Nuclear Physics*, v. 4, Sept. 1957, p. 375-394.

The possibility of the application of the strong coupling collective model (rotational model) to nuclei in the region following O^{16} (s-d shells) is discussed.

1263* Conversion-Electron and Photon Spectra of Gd^{147} and Gd^{149}. Virginia S. Shirley, Warren G. Smith, and John O. Rasmussen. *Nuclear Physics*, v. 4, Sept. 1957, p. 395-407.

Information on the excited levels in Eu^{147} and Eu^{149} was obtained by studying the conversion-electron and photon spectra of Gd activities produced by α particle bombardments on samarium oxide and deuteron bombardments on europium oxide.

1264* Photoproduction Processes and Dispersion Relations. A. A. Logunov, A. N. Tavkhelidze, and L. D. Solovyov. *Nuclear Physics*, v. 4, Sept. 1957, p. 427-452.

Dispersion relations for photoproduction of π-mesons on nucleons are presented in a form convenient for phase shift analysis.

1265* Elastic Scattering of Antiprotons by Nuclei. I. E. McCarthy. *Nuclear Physics*, v. 4, Sept. 1957, p. 463-468.

1266* Angular Correlations of Gamma Ray Cascades Following the Decay of Eu^{152}. S. Ofer. *Nuclear Physics*, v. 4, Sept. 1957, p. 477-487.

Measurements support the suggestion that the 1082 and 1226 k.e.v. levels of Sm^{152} should be interpreted as collective vibrational levels.

1267* Report From Marcoule. *Nuclear Power*, v. 2, Sept. 1957, p. 356-361.

France's bid for atomic power "Marcoule GI" is in operation producing Pu and electricity.

1268* Beryllium. G. L. Miller. *Nuclear Power*, v. 2, Sept. 1957, p. 362-365.

Beryllium is proposed as the choice material for fuel elements to permit higher-temperature operation in Calder-type reactors. (To be continued.)

1269* Nuclear Engineering Materials. M. B. Waldron. *Nuclear Power*, v. 2, Sept. 1957, p. 367-368.

Possibilities for reduction of the cost of initial fuel charges in Britain's new power station, which runs half as much again as the reactors themselves.

1270* The RWE-Atomkraftwerk Kahl. A Closed-Cycle Boiling-Water Reactor. H. J. Coles. *Nuclear Power*, v. 2, Sept. 1957, p. 369-373 + 1 plate.

Plans for Germany's first nuclear power plant.

1271* Coolant Choice for the V.H.T. Reactor. Peter Fortescue. *Nuclear Power*, v. 2, Sept. 1957, p. 381-385.

1272* Bradwell. *Nuclear Power*, v. 2, Oct. 1957, p. 403-435.

Consists of 12 papers on the atomic reactor at Bradwell, covering plans, erection, and operation of the reactor.

1273 Evaluation of a Homogeneous Reactor. *Nucleonics*, v. 15, Oct. 1957, p. 64-71.

Engineering design; economic analysis.

1274 Fuel Reprocessing by Aqueous Methods. Edward L. Anderson, Jr. *Nucleonics*, v. 15, Oct. 1957, p. 72-77.

First article of a series covering aqueous processing, volatility and pyrometallurgical methods, high-level waste disposal, and processing economics.

1275 Calculating Gamma Heating in Reactor Structures. H. C. Claiborne, C. M. Copenhaver, H. W. Bertini, and T. B. Fowler. *Nucleonics*, v. 15, Oct. 1957, p. 114-121.

Determination of temperature distribution due to heating caused by absorption of γ-rays.

1276* (Italian.) Measuring the Energy of Electron Pairs With More Than 1 GeV in Nuclear Emulsions. **Mesure de l'énergie des paires d'électrons de plus de 1 GeV dans les emulsions nucléaires.** R. Weill, M. Gailloud, and Ph. Rosselet. *Nuovo Cimento*, v. 6, ser. 10, Sept. 1957, p. 413-424.

Establishes an absolute method which diminishes uncertainties due to multiple scattering and grain dispersion.

1277* (English.) **The Interactions of Positive K-Mesons With Nuclei in Photographic Emulsion at Energies in the Region 0—130 MeV.** B. Bhowmik, et al. *Nuovo Cimento*, v. 6, ser. 10, Sept. 1957, p. 440-477.

1278* (English.) **Anomalous Heavy Primary Cascades Recorded on Viking 10 Rocket Flight.** H. Yagoda. *Nuovo Cimento*, v. 6, ser. 10, Sept. 1957, p. 559-570 + 5 plates.

Records two examples of heavy primaries which on collision with emulsion nuclei are not destroyed catastrophically.

1279* (English.) **Photoprotons From ^{100}Mo.** F. Ferrero, A. O. Hanson, R. Malvano, and C. Tribuno. *Nuovo Cimento*, v. 6, ser. 10, Sept. 1957, p. 582-591.

1280* (English.) **The Parity of Elementary Particles.** P. T. Matthews. *Nuovo Cimento*, v. 6, ser. 10, Sept. 1957, p. 642-649.

In determining the intrinsic parities of elementary particles, the invariance of the interactions under gage transformations makes the relative parity of certain groups of particles a matter of convention.

1281* (English.) **Strange-Particle Effects in S-Wave Pion-Nucleon Scattering.** J. S. Langer. *Nuovo Cimento*, v. 6, ser. 10, Sept. 1957, p. 674-681.

A very simple calculation is found to agree quite well with experiment.

1282 Fuel Costs in Spherical Slurry Reactors. M. W. Rosenthal, M. Tobias, and T. B. Fowler. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2313, Sept. 1957, 42 p. (UF767 U3o Contin.)

Fuel costs were obtained for two-region aqueous homogeneous reactors containing $U^{233}O_2$-ThO_2-D_2O slurry in both core and blanket regions.

1283 Measurement of the Average Energy Lost by a 5 Mev Alpha Particle in Producing an Ion Pair in Water Vapor. W. F. Patton, G. S. Hurst, and T. E. Bortner. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2352, Sept. 1957, 51 p. (UF767 U3o Contin.)

The energy value found was 37.6 ± 0.2 e.v. per pair.

1284 Reactor Design and Feasibility Problem. "U-233 Power-Breeder Reactor." R. R. Halik, et al. *Oak Ridge School of Reactor Technology (U. S. Atomic Energy Commission)*, CF-54-1-81, Jan. 1954, 263 p. (UF767 Un3.1cf Contin.)

Barring unforeseen difficulties, a reactor system employing the principle of transfer of solid particles by gases is feasible. The reactor as proposed is semi-spherical in shape, employs graphite as a moderator in both active regions, burns U-233 as a fuel, and makes use of thorium carbide as the fertile material.

1285 Plutonium Fuel Requirements for Operation of the MTR. H. L. McMurry and B. W. Johnson. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16378, June 1957, 31 p. (UF767 Un3.1id Contin.)

An approximate equation for the fuel content of Pu^{239} per assembly needed to give the same charge life as a stated content of U^{235} is derived by a perturbation method.

1286 Relative Neutron Lifetimes in the MTR Fueled With U^{235} and Pu^{239}. H. L. McMurry and B. W. Johnson. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16391, Aug. 1957, 16 p. (UF767 Un3.1id Contin.)

Neutron lifetimes of 81 and 68 μ sec. are calculated for the MTR fueled with U^{235} and Pu^{239}, respectively, using the Nordheim equation. The model employed probably underestimates the lifetimes, but the ratio of $68/81 = 0.84$ for the Pu^{239} to U^{235} lifetime should be significant.

1287 (English.) **Formation and Properties of Selenium-71.** A. H. W. Aten, Jr. and A. C. Pieterse. *Physica*, v. 23, Aug. 1957, p. 799-800.

Formation of this 4.5 minute half-life isotope from Ge-70 is described.

1288 Thermal-Neutron Fission Cross Sections for Isotopes of Plutonium, Americium, and Curium. E. K. Hulet, R. W. Hoff, H. R. Bowman, and M. C. Michel. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1294-1296.

1289 Coulomb Excitation of Iron-57. G. F. Pieper and N. P. Heydenburg. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1300-1302.

Experiments confirmed the existence of excited states at 14, 137, and 365 k.e.v.

1290 Elastic Scattering of Alpha Particles. D. D. Kerlee, J. S. Blair, and G. W. Farwell. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1343-1362.

A study of medium-energy α particles at fixed angles was made for 28 nuclides ranging from Ni to Pu.

1291 Stopping Power of a Medium for Heavy, Charged Particles. Michal Gryziński. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1471-1475.

It is shown that the orbital motion of electrons in the molecules of a medium is important for the stopping power of slow charged particles. This is due to the strong dependence of the momentum transfer in a Coulomb field of the relative velocity. Equations for determining the absolute stopping power of an arbitrary medium are derived on the basis of classical mechanics for the entire nonrelativistic energy range.

1292 Penetration of Electron Beams Into Water Below the Critical Energy. L. Adawi. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1476-1482.

The "moments technique" was applied to the calculation of the spatial distribution of the energy dissipation in water by electron beams of energies 10 to 25 m.e.v. A continuous energy loss is assumed and the energy-range relationships are obtained taking into account the ionization and radiation losses.

1293 Range Straggling of High-Energy Electrons in Carbon. J. E. Leiss, S. Penner, and C. S. Robinson. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1544-1548.

Approximate range straggling curves for the slowing down of high-energy electrons in C were calculated by a Monte Carlo technique using the University of Illinois digital computer. The

effects of ionization straggling, radiation, and multiple scattering are included. Calculations were made for incident electron energies from 5 to 55 m.e.v.

1294 Inelastic Scattering of 20-kev Electrons in Metal Vapors. Lewis B. Leder. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1569-1578.

The low-energy losses of 20 k.e.v. electrons passing through the vapors of Zn, Cd, Hg, Na, K, Mg, Ca, Sb, Pb, and KCl were measured by using an electrostatic analyzer previously used for measuring electron energy losses in thin metal films.

1295 Annihilation of Positrons in Gases. Milton Heinberg and Lorne A. Page. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1589-1600.

The angular correlation of the two-photon annihilation of positrons annihilating in gases at high pressures demonstrates two modes of decay in all gases tested that have low-lying energy states.

1296 Ground State and Excited Levels of Cl^{40}. Igal Talmi. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1601-1602.

A calculation to determine the level scheme of Cl^{40} is done by using matrix elements of the nuclear interaction determined from a previous analysis of nuclear energies. The value of the spin $J=2$ obtained for the ground state is in agreement with experimental results.

1297 Elastic Scattering of 7.5-Mev Protons. W. F. Waldorf and N. S. Wall. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1602-1608.

Measurements of the angular distributions of 7.5-m.e.v. protons elastically scattered from a series of elements with atomic numbers Z=13 to Z=49.

1298 Search for Antineutrino Interaction With Deuterons. Clyde L. Cowan, Jr. and Frederick Reines. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1609-1611.

The antineutrino-induced disintegration of the deuteron was sought using the antineutrino flux from a production reactor at the Savannah River Plant and a liquid scintillation detector, with a negative result. An upper limit of 4×10^{-43} cm^2 was placed on the interaction cross section as compared with present predictions of 2×10^{-43} cm^2. Suggestions are given for improving this experimental limit.

1299 Energy Dependence of Reactions at Thresholds. C. Briet. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1612-1615.

As a development of Wigner's work on the subject, the behavior of nuclear reactions at thresholds is discussed by employing the *R*-matrix formalism with special attention to the effect of a nuclear reaction threshold in a particular channel on the energy dependence in other channels.

1300 T (d,n) He^4 Reaction. S. J. Bame, Jr. and J. E. Perry, Jr. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1616-1620.

The differential cross sections for neutron production in this reaction were measured over the deuteron bombarding-energy range 0.25 to 7.0-m.e.v. Legendre polynomial fits to the data are presented and compared with existing data. The total cross section plotted as a function of deuteron energy has an anomalous behavior which may indicate a broad level in He^5 near 20-m.e.v. excitation energy.

1301 Transition Energies and Nuclear Levels in Sm^{152}, Sm^{154}, Gd^{152}, and Gd^{154} as Derived From the Separated Isotopes of Europium. J. M. Cork, M. K. Brice, R. G. Helmer, and D. E. Sarason. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1621-1625.

1302 Magnetic Moment of the Deuteron and Nucleon-Nucleon Spin-Orbit Potentials. Herman Feshbach. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1626-1627.

The change in the magnetic moment of the deuteron arising from the presence of a spin-orbit potential in the nucleon-nucleon interaction was estimated for two recent proposals. The effects are found to be substantial.

1303 Decay Scheme of Co^{57}. Donald G. Gardner and W. Wayne Meinke. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1628-1631.

Studies using β and γ scintillation techniques.

1304 Decay of Cr^{51}. S. Ofer and R. Wiener. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1639-1641.

The spectrum of γ-rays from Cr^{51} was examined, including the spectrum in coincidence with the strong 325 k.e.v. γ-ray. The shape and intensity of the internal bremsstrahlung spectrum accompanying the *K*-capture transition to the ground state was found to be in fair agreement with theory, as also was, within the experimental error, the intensity of the internal bremstrahlung accompanying the *K*-capture decay to the 325 k.e.v. level.

1305 Calorimetric Determination of the Average Total Kinetic Energy of Fragments From Fission of U^{235}. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1642-1645.

A value of 166 ± 2 m.e.v. was obtained, in excellent agreement with other measurements.

1306 Nucleon Exchange in Deuteron Stripping Reactions. A. P. French. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1655-1663.

Discusses the process of stripping with nucleon exchange that appears when the antisymmetry is taken into account. With the help of simplifying assumptions, expressions are obtained for the exchange amplitude in a direct transition between initial and final states of the system. The relation of this treatment to a theory involving compound nucleus formation is considered.

1307 Neutron Separation Energies and Pairing Energies for Heavy Nuclei. W. H. Johnson, Jr. and V. B. Bhanot. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1669-1673.

A six-inch double-focusing mass spectrometer was employed to determine 32 mass differences between neighboring isotopes of even-Z elements in the region Z=64 to 82. Neutron separation energies and neutron pairing energies are calculated from the results.

1308 Circular Polarization of Internal Bremsstrahlung. A. Pytte. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1681-1685.

A calculation is made of the circular polarization of the internal bremsstrahlung in allowed β-decay with the most general β-interaction. The polarization is found to rise from zero at the low-energy end of the spectrum to a maximum value at the high-energy end. This maximum value depends critically on the relative magnitudes of the coupling constants in the β-interaction.

1309 Elastic Scattering of a Σ^+ Hyperon From a Free Proton. Francis C. Gilbert and R. Stephen White. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1685-1686.

An event was found in nuclear emulsion which is interpreted as an elastic scattering of a Σ^+ hyperon from a free proton. The center-of-mass scattering angle was 125° and the energy of the hyperon at the point of scattering was 22.9 m.e.v.

1310* (English.) **Multichannel Angular Correlation Measurement of Gamma Rays From the Disintegration of Ag^{110m} and Spin Assignment of Excited Levels of Cd^{110}.** Mitsuo Sakai, Haruko Ohmura, and Teruo Momota. *Physical Society of Japan, Journal*, v. 12, Sept. 1957, p. 985-993.

The spin values of Cd^{110} in 2.93, 2.48, and 1.54 m.e.v. excited states were found to be 3−, 2+, and 2± respectively; the radiation characteristics of three γ-rays of energies 0.885, 0.935, and 1.390 m.e.v. were also determined.

1311 A Phase-Shift Analysis of Nucleon-Nucleon Scattering at 95 MeV. R. J. N. Phillips. *Physical Society, Proceedings*, v. 70, no. 454A, Oct. 1957, p. 721-728.

Analysis of cross sections and polarizations at 95 m.e.v. is made in terms of S, P, and D partial waves. Three distinct small regions in the phase-shift space were found to be able to account for the data.

1312 The Energy Spectrum of the 350 MeV Neutron Beam From the Liverpool Synchrocyclotron. A. Ashmore, R. G. Jarvis, D. S. Mather, and S. K. Sen. *Physical Society, Proceedings*, v. 70, no. 454A, Oct. 1957, p. 735-744.

Spectrum of the recoil protons produced in n-p collisions was measured with a counter telescope containing a Cu absorber of variable thickness. The shape of the spectrum was consistent with the assumption that the neutrons are produced in "elastic" proton-neutron collisions in the Be target.

1313* (Russian.) Linear Theory of Synchrotron Oscillations. **Lineinaia Teoriia sinkhrotronnykh kolebanii. II.** Loss of Particles in the Process of Acceleration and Tolerance Theory. **Poteri chastits v protsesse uskoreniia i teoriia dopuskov.** L. L. Gol'din and D. G. Koshkarev. *Pribory i Tekhnika Eksperimenta,* 1957, no. 3, May-June, p. 3-9.

Studying the various perturbations of accelerated particles in synchronous oscillation from the point of view of the amount of particles lost during these perturbations. Development of a new tolerance theory.

1314* (Russian.) Use of Wilson Chamber in the Synchrotron Emission Beam and Other Auxiliary Equipment. **Kamera vil'sona dlia raboty v puchke izlucheniia sinkhrotrona i vspomogatel'naia apparatura.** A. G. Gerasimov, A. N. Gorbunov, Iu. S. Ivanov, A. V. Kutsenko, and V. M. Spiridonov. *Pribory i Tekhnika Eksperimenta,* 1957, no. 3, May-June, p. 10-14.

Description of the equipment used in study of photonuclear processes, and of Wilson chamber placed in the magnetic field. Description of the handling of the chamber, synchronization of its work with that of synchrotron, and of the apparatus used to measure the intensities of emission impulses.

1315* (Russian.) Measuring Primary Ionization by the Method of Medium Length Opening in the Wilson and Diffusion Chambers. **Izmerenie pervichnoi ionizatsii po metodu srednei dliny prosveta v kamere vil'sona i v diffuzionnoi kamere.** V. V. Bovin, P. A. Krupchitskii, I. I. Pershin, and B. V. Chirikov. *Pribory i Tekhnika Eksperimenta,* 1957, no. 3, May-June, p. 19-23 + 2 plates.

Determining the primary ionization by the measurement of the average length of opening between the track left by particles in the Wilson chamber and the one left by it in a diffusion chamber.

1316* (Russian.) Use of Plastic Scintillators in the Registration of Radioactive Emissions. **Effektivnye stsintilliatsionnye plastmassy dlia registratsii radioaktivnykh izluchenii.** N. A. Adrova, M. M. Koton, Iu. N. Panov, and F. S. Florinskii. *Pribory i Tekhnika Eksperimenta,* 1957, no. 3, May-June, p. 43-47.

The plastics from which the effective scintillators could be built are prepared by the addition to styrol monomer of 1 to 2% (by weight) of aromatic or heterocyclic compounds, having conjugated double bonds, with ensuing polymerization in the presence of 0.2% benzoyl peroxide.

1317* Cloudy Crystal Ball Model for Neutron Reaction at Higher Energies. Mitsuji Kawai, et al. *Progress of Theoretical Physics,* v. 18, July 1957, p. 66-80.

A systematic analysis using the cloudy crystal ball model is carried out for the total cross sections and the non-elastic cross sections of neutron scattering by nuclei. The energy range considered extends from 3.5 to 14.0 m.e.v.

1318* Inelastic Scattering of Nucleons by Light Nuclei. Ryoichi Kajikawa and Wataro Watari. *Progress of Theoretical Physics,* v. 18, Aug. 1957, p. 103-120.

1319* Nuclear Magnetic Relaxation in Solid Hydrogen. Tôru Moriya and Kazuko Motizuki. *Progress of Theoretical Physics,* v. 18, Aug. 1957, p. 183-199.

A theoretical study of the mechanisms of the relaxation in solid H_2 and solid D_2 related with their nuclear magnetic resonances.

1320 Efficiencies and Photofractions for Sodium-Iodide Crystals. W. F. Miller, John Reynolds, and William J. Snow. *Review of Scientific Instruments,* v. 28, Sept. 1957, p. 717-719.

Monoenergetic γ-rays, from a broad parallel beam, incident on sodium-iodide crystals of various sizes, were calculated by the Monte Carlo method.

1321* (French.) Thermonuclear Reactions Induced by Means of a Discharge in Gases. **Sur les réactions thermonucléaires induites par la décharge dans les gaz.** Raymond Moch. *Revue Générale des Sciences Pures et Appliquées,* v. 64, July-Aug. 1957, p. 209-222.

Energy exchange inside the plasma. Loss of energy and the maintaining of a fusion reaction. Thermonuclear reactor operation. Soviet experiments on pulsed discharges in gases.

1322* Nuclear Reactions at High Energies. I. Experimental. K. F. Chackett. *Royal Institute of Chemistry, Journal,* v. 81, Sept. 1957, p. 616-628 + 1 plate.

Includes accelerators, bombardment conditions, and chemical techniques. (To be continued.)

1323* (English.) **Nuclear Reactions Induced by High Energy Particles.** Gösta Rudstam. *Svensk Kemisk Tidskrift,* v. 69, no. 8, 1957, p. 378-393.

Chemical and physical experiments on spallation and the fission reaction.

1324* (German.) Physical Bases of Thermal Nuclear Reactors. **Physikalische Grundlagen von thermischen reaktoren.** R. Berndt. *Technik,* v. 12, Aug. 1957, p. 547-553.

Determining the intensity of the nuclear reaction by the neutron flow. Maximum admissible temperature per cm^3 of the surface of the fission elements. Rising neutron density. Diffusion equation for fast neutrons. Experimental reactor physics.

1325* (German.) Modern Cyclotrons for Ions. **Moderne Kreisbeschleuniger für Ionen.** F. Timple. *Technik,* v. 12, Aug. 1957, p. 541-547.

Structure, operation, and phase stabilization of the classical cyclotron, the synchro-cyclotron, proton synchrotron, and accelerators.

1326 A Simplified Model of the Elastic Scattering of Molecular Beams From Solid Surfaces. W. C. DeMarcus and A. J. Beck, Jr. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission),* K-1346, Oct. 1957, 20 p. (UF767 Un3.1k Contin.)

Deals with the theory of scattering by single atoms imbedded in an otherwise perfectly plane surface.

1327 The Small-Volume Internal-Sample Liquid Scintillation Counter. Instrumentation, Performance Characteristics, and Capabilities. F. Newton Hayes and Donald G. Ott. *University of California, Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-2095, Sept. 1957, 37 p. (UF767 U3La Contin.)

Steps in the complex transformation from disintegration of a radioactive nuclide to emergence of a count on the scaler are explored for their physical significance. Characteristic data are given for H^3, C^{14}, and background counting with a representative coincidence instrument.

1328 Decay Studies of Some Neutron-Deficient Isotopes of Antimony and Tellurium. Ann Rhodes. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission),* UCRL 3879, Aug. 1957, 23 p. (UF767 U3u Contin.)

Four new half-lives were observed in the neutron-deficient Sb region. These are 4.0 ± 0.3 hr., 60 ± 10 min., 30 ± 5 min., and 7 ± 2 min. New half lives discovered for light Te isotopes are 7.5 ± 1.5 hr., 1.4 ± 0.2 hr., and 16 ± 2 min.

1329* (German.) Radiation Detecting and Measuring Processes. **Strahlennachweis- und Messverfahren.** Wilhelm Hanle, Hans Schneider, and Gustav-Adolf Voss. *VDI Zeitschrift,* v. 99, Sept. 1957, p. 1285-1295.

Schematic representation of the effect of rapid particles and hard quanta passing through matter. Photographic, chemical, and optical recording methods. Electrical apparatus for measuring radiation. Scintillation and crystal counters.

1330 Materials and Welding for Nuclear Power Fuel Elements. L. M. Wyatt and F. S. Dickinson. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 378 + 8 pages.

Several forms of fuel element are reviewed illustrating the importance of welding and its related processes to the manufacturing procedure, and the methods adopted to check the consistency of joints involved. Welding equipment and techniques for welding refractory metals are included.

1331* (German.) Accelerators for Experimental Nuclear Physics. **Beschleuniger für die experimentelle Kernphysik.** Christian Keck. *Wissenschaftliche Annalen,* v. 6, Sept. 1957, p. 610-643.

Description theory, and operation of the cyclotron, synchro-cyclotron, and electron and photon synchrotrons.

1332* (German.) Measuring the Correlation Between β- and Circularly Polarized γ-Radiation in Co^{60}, Zr^{95}, and Sb^{124}. **Messung der Korrelation zwischen β- und zirkular polarisierter γ-Strahlung an Co^{60}, Zr^{95} und Sb^{124}.** H. Appel and H. Schopper. *Zeitschrift für Physik*, v. 149, no. 1, 1957, p. 103-106.

Circular polarization of the γ-quanta emitted after γ-radiation following a β-disintegration. Deductions concerning the β-interaction.

See also: **66** (advances in radiobiology); **175** (applications of ceramics); **181** (radiation damage in graphite); **208** (isotope separation by distillation); **293** (low-level alpha-scintillation counter); **508** (chemical effects of ionizing radiation); **533** (design of power plant); **568** (analog computer for nuclear power studies); **569** (analog computations of Xe poison); **757** (transfer in ducts); **933** (Pu in nuclear power reactors); **936** (characteristics of Th); **942** (corrosion in high-temperature water); **1043** (effects of high burnup on uranium); **1175** (U-Si fuel elements); **1205** (safety precautions for γ-rays); **1217** (nondestructive testing of reactor components); **1438** (disposal of radioactive wastes); **1441** (alpha ray air monitor); **1447** (effluent treatment).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

1333* Training Program for Box Plants. Raymond S. Owen. *Fibre Containers and Paperboard Mills*, v. 42, Sept. 1957, p. 44 + 3 pages.

Principles presented have very wide application.

1334* Importance of Research to Industry. J. Homer Winkler. *Printing Equipment Engineer*, v. 88, Oct. 1957, p. 39 + 3 pages.

To meet competition, a continuing search for new materials, methods, and equipment is ncessary. Companies in the packaging field are urged to seriously consider the utilization of contract research facilities, which offer a wide range of services.

1335 Too Many Solutions. G. F. Hadley. *Product Engineering*, v. 28, Oct. 14, 1957, p. 92-94.

How and when to use linear programming to choose the best solution.

1336* Research as a Corporate Function. Merritt L. Kastens. *SRI, Journal*, v. 1, no. 3, 1957, p. 91-96.

A discussion of the administration of research organizations and its place in the corporate structure.

1337 Management's First Line. *Steel*, v. 141, Oct. 14, 1957, p. 76-77.

Discusses the qualities of a good, modern-day foreman now and 20 yrs. hence.

ORE AND MATERIALS BENEFICIATION

1338 The Separation of Zirconium and Hafnium by Differential Reduction of Their Tetrachlorides. I. E. Newnham. *American Chemical Society, Journal*, v. 79, Oct. 20, 1957, p. 5415-5417.

If crude $ZrCl_4$, containing $HfCl_4$, is heated with Zr powder *in vacuo* at 400-450 C, most of the $ZrCl_4$ is reduced to the comparatively involatile trichloride. The $HfCl_4$ is not reduced and, together with any unreduced $ZrCl_4$, can be recovered by sublimation as a Hf concentrate with a Hf/Zr ratio higher than 10%.

1339 Costs on New Processes for Solvent Extraction of Uranium. K. Glenn Shaw and Ray S. Long. *Chemical Engineering*, v. 64, Nov. 1957, p. 251-256.

New operational and cost information on solvent extraction for hydrometallurgical operations. Data can be applied to other systems.

1340* (German.) The BASF Turbulent-Layer Roasting Process. **Über das Wirbelschicht-Röstverfahren der BASF.** Adolf Johannsen and Willi Danz. *Chemie-Ingenieur-Technik*, v. 29, Sept. 1957, p. 563-572.

Utilization of the heat of roasting; influence of grain size and moisture content of the raw materials; possibility of using furnaces of small dimensions.

1341* (French.) Oxidation Reactions of Some Sulfide Ores. **Réactions d'oxydation de quelques minerais sulfurés.** M. Lefèvre, J. Lemmerling, and A. Van Tiggelen. *Chimie & Industrie*, v. 78, Aug. 1957, p. 107-114.

The oxidation of blende, bornite, and chalcopyrite was investigated in the 200 to 300 C range by a manometric method. The reaction is primarily a direct sulfatization, the rate controlling phase being the activated adsorption of oxygen. At temperatures up to 800 C the reaction was studied by thermogravimetry.

1342* (French.) The Combined Production of Manganese Oxide Concentrates and of Fertilizers. **La production combinée des concentrés d'oxyde de manganèse et des engrais.** A. Baniel, R. Blumberg, E. J. Cejtlin, F. Grynbaum, and O. Schächter. *Chimie & Industrie*, v. 78, Aug. 1957, p. 115-120.

Review of hydrometallurgical methods for treating low-grade Mn ores. A new method starting with leaching of the ore with SO_2. The sulfate ions thus obtained are used for the production of potassium or ammonium sulfate.

1343 Phase Two—Study of the Effects of Crude Oil Constituents on the Reduction and Precipitation of Uranium. *Colorado School of Mines Research Foundation, Inc. (U. S. Atomic Energy Commission)*, RME-3149, May 1957, 21 p. (TN21 Un3.1r Contin.)

1344 Process Cuts Pelletizing Costs. *Engineering and Mining Journal*, v. 158, Oct. 1957, p. 75-77.

Economies in fuel and maintenance costs, and virtual elimination of pellet breakage are claimed for new process for converting finely ground magnetite concentrates into a properly sized, hard, durable, pelletized product for smelting.

1345 How Electrolytic Zinc Roasts Zinc Concentrates. *Engineering and Mining Journal*, v. 158, Oct. 1957, p. 78-81.

Operation of hearth and flash roasters; ball milling of calcine; scrubbing exit gases; ventilation system.

1346 The Purex Process—A Solvent Extraction Reprocessing Method for Irradiated Uranium. E. R. Irish and W. H. Reas. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-49483A, Apr. 1957, 33 p. (UF767 Un3.1hw Contin.)

Details of the over-all process, utilizing tri-butyl phosphate solvent (in a kerosene-type diluent) and HNO_3 salting agent, along with chemical process flowsheets.

1347 Microorganisms in Leaching Sulfide Minerals. Loren C. Bryner and Ralph Anderson. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1721-1724.

Laboratories studies reveal that molybdenite is oxidized by autotrophic bacteria at a much greater rate than under sterile conditions.

1348* (Russian.) Dressing of Mixed Ores From the Berjozovsk Deposit. **Obogaschchenie smeshannykh rud berezovskogo mestorozhdeniia.** L. A. Glazunov, O. A. Ratnikova, and V. I. Meshchaninova. *Tsvetnye Metally*, v. 30, no. 9, Sept. 1957, p. 10-14.

Development of a new method of treatment of mixed ores. In contrast to the usual method the pyritic flotation with application of sulfuric acid and sodium carbonate (pH=8-8.5) is introduced between sulfide and acidified flotation cycles; during the grinding process calcium is added. This method permits increased extraction of Pb (15%), Zn (5%), and Cu (3.5%) and also decerases the Zn content in the Pb concentrate to 10%.

1349* (Russian.) Extraction of Indium as a By-Product From Darassun Ores. **Poputnoe izvlechenie indiia iz darasunskikhrud.** *Tsvetnye Metally*, v. 30, no. 9, Sept. 1957, p. 14-18.

Method of obtaining In-containing concentrates from Pb ores. Extraction of In from Cu-Pb-Zn concentrate by means of chlorination roasting followed by leaching with sulfuric acid and chloride solution. More than 90% of the In, Cu, Pb, and Zn go into solution.

1350* (Russian.) Sulfating-Roasting of Sulfides of Non-Ferrous Metals in Fluo-Solid Process. **Sul'fatiziruiushchii obzhig sul'fidov tsvetnykh metallov v kipiashchem sloe.** G. Ia. Leizerovich, I. S. Lonskii, and V. Z. Charnyi. *Tsvetnye Metally*, v. 30, no. 9, Sept. 1957, p. 19-25.

Sulfating-roasting studies of Cu and Cu-Zn concentrates. Development and testing of a large laboratory furnace for investigation of fluo-solids roasting of various materials.

1351* (Russian.) Sulfuric Acid Treatment of Sublimates Containing Lead and Zinc Oxides. **Sernokislotnaia pererabotka vozgonov, soderzhashchikh okisi tsinka i olova.** A. K. Evodokimova, A. I. Migina, and A. A. Tseidler. *Tsvetyne Metally*, v. 30, no. 9, Sept. 1957, p. 25-31.

Investigation of three types of sublimates formed during smelting of secondary Cu, fuming of slags from smelting secondary Cu, and fuming of slags from a lead plant. Characterization and acid leaching of sublimates. Sulfatization followed by leaching with water and experiments on reciprocal action of lead and zinc oxides during roasting. Composition of the sublimates depends on nature of the raw material, method of treatment, and volatility of metals and their compounds.

1352 The Role of Viscosity in Dense-Medium Coal Cleaning. M. R. Geer, Michael Sokaski, John M. West, and H. F. Yancey. *U. S. Bureau of Mines, Report of Investigations* 5354, Aug. 1957, 64 p. (TN21 Un3r)

Viscosity can be expected to impair plant operation under certain conditions. Factors involved are the nature of the clay associated with the raw coal, size and density composition of the coal, density of the medium, and the adequacy of the medium cleaning circuit.

1353* (German.) Utilization of a New Flocculating Agent to Improve the Clarification and Filtering Effect in Processing Rammelsberg Ores. **Verwendung neuer Flockungsmittel zur Verbesserung des Klär- und Filtereffekts bei der Aufbereitung der Rammelsberger Erze.** Martin Clement. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 10, Sept. 1957, p. 421-427.

Use of gelatine, high polymers, and sulfates and chlorides of heavy metals as coagulating and flocculating agents for pyrite ores.

See also: **560** (crushers and grinding mills).

PHYSICS

1354 Localization of High-Frequency Tones. W. E. Feddersen, T. T. Sandel, D. C. Teas, and L. A. Jeffress. *Acoustical Society of America, Journal*, v. 29, Sept. 1957, p. 988-991.

Includes physical measurements of interaural time differences and intensity differences, and attempts to relate these differences to the localization response at a variety of frequencies.

1355 Experimental Study of Mechanical Dissipation in Butt-Joined ADP Crystal Plates. B. J. Faraday and D. J. G. Gregan. *Acoustical Society of America, Journal*, v. 29, Sept. 1957, p. 1001-1004.

Design of L.F. piezoelectric transducers for underwater sound transmission.

1356 Ultrasonic Shear and Compressional Relaxation in Liquid Glycerol. Robert Piccirelli and T. A. Litovitz. *Acoustical Society of America, Journal*, v. 29, Sept. 1957, p. 1009-1020.

1357 Acoustic Refraction and Scattering With Compliant Elements. I. Measurements in Water. II. Analysis. W. J. Toulis. *Acoustical Society of America, Journal*, v. 29, Sept. 1957, p. 1021-1033.

A compliant tube, formed from commercially available round tubing by deforming its cross section elliptically, is a simple example of such a structure.

1358* (English.) **Magnetic Analysis of X-Ray Produced Photo and Auger Electrons.** Evelyn Sokolowski, Carl Nordling, and Kai Siegbahn. *Arkiv för Fysik*, v. 12, no. 4, 1957, p. 301-318.

A precision method for determining atomic binding energies by analysis of photo electrons expelled from thin evaporated layers by X-radiation.

1359 Ultraviolet Spectra of LiH and LiD. R. Velasco. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1204-1214.

Absorption spectra have been observed in the near ultra-violet with high dispersion and absorbing path lengths up to 16 m. A new band system has been found in each molecule.

1360 Vibration-Rotation Bands of Ammonia. II. The Molecular Dimensions and Harmonic Frequencies of Ammonia and Deuterated Ammonia. W. S. Benedict and Earle K. Plyler. *Canadian Journal of Physics*, v. 35, Oct. 1957, p. 1235-1241.

A summary is given of molecular constants for NH_3 and ND_3, as derived from high-resolution infra-red spectra of a number of fundamental, overtone, and combination bands. Preliminary estimates are given for the equilibrium moments of inertia, the molecular dimensions, and the force constants of the harmonic potential function.

1361* (French.) Spectrum Profile and Causes of the Widening of Some Highly Monochromatic Radiations of Krypton 86. **Profil spectral et causes d'élargissement de quelques radiations hautement monochromatiques du krypton 86.** Jean Terrien, Jean Hamon, and Toshiro Masui. *Comptes Rendus*, v. 245, Sept. 9, 1957, p. 960-963.

The orange radiation $2p10\text{-}5d_5$ of isotope 86 of kryton was produced with spectral symmetry and almost without any disturbance. Its use as a standard of length.

1362* (French.) Luminescence at Very Low Temperatures of Red HgI_2 Single Crystals. **Luminescence de monocristaux de I_2Hg rouge aux très basses températures.** Manuel Sieskind. *Comptes Rendus*, v. 245, Sept. 16, 1957, p. 1006-1009.

The luminescence was shown by clear lines and bands. The emission spectra of the crystals perpendicular to the axis were different from the spectra of the crystals parallel to the axis. This must be related to the dichroism of the absorption line spectra.

1363* (Russian.) On the Theory of the Concentrational Quenching of Fluorescence in Solutions. **K teorii kontsentratsionnogo tusheniia fluorestsentsii rastvorov.** B. Ia. Sveshnikov. *Doklady Akademii Nauk, SSSR*, v. 115, no. 2, July 11, 1957, p. 274-276.

Mathematical formulation of the damping, outflow, and duration laws for quenched solution fluorescence when the effect of the closest unexcited molecules are taken into account.

1364 Cerium-Activated Halophosphate Phosphors. S. T. Henderson and P. W. Ranby. *Electrochemical Society, Journal*, v. 104, Oct. 1957, p. 612-615.

Describes the characteristics of a new group of alkaline earth halophosphate phosphors activated by Ce and Mn, and contrasts their behavior with those containing other primary activators.

1365 Domain Effects in Polycrystalline Barium Titanate. E. C. Subbarao, M. C. McQuarrie, and W. R. Buessem. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1194-1200.

1366 Thermodynamics for Elastic Solids in the Electrostatic Field. I. General Formulation. James C. M. Li and Tsuan Wu Ting. *Journal of Chemical Physics*, v. 27, Sept. 1957, p. 693-700.

A condensed collection of all the thermodynamic relations among first derivatives for elastic solids under the outside variation of only tempeature, stress, and the electrostatic field.

1367* Estimation of the Frequencies of Thin Elastic Plates With Free Edges. Tosio Kato, Hiroshi Fujita, Yoshimoto Nakata, and Morris Newman. *Journal of Research, National Bureau of Standards*, v. 59, Sept. 1957, p. 169-186.

A variational method is proposed. As a numerical example, the fundamental frequency of a square plate with the Poisson ratio 0.225 is calculated with a satisfactory result, the possible relative error being less than 1/2000.

1368* Speed of Sound in Water by a Direct Method. Martin Greenspan and Carroll E. Tschiegg. *Journal of Research, National Bureau of Standards*, v. 59, Oct. 1957, p. 249-254.

1369 Energy Level Calculations for F-Centers and Interstitial Positive Ions in Alkali Halides. W. A. Smith, Jr. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1720, Apr. 1957, 50 p. (UF767 Un3.1ka Contin.)

A self-consistent quantum mechanical method was used to calculate energy levels of electrons trapped by negative ion vacancies and by interstitial positive ions in the halides of Li, Na, K, and Rb.

1370 Thermodynamic Properties of Compressed Water. T. C. Tsu and D. T. Beecher. *Mechanical Engineering*, v. 79, Oct. 1957, p. 939-943.

Enthalpy was plotted against entropy with lines of constant pressure, temperature, and specific volume, resulting in a chart covering the temperature range 32 to 705.4 F and the pressure range 0.08854 to 6000 psi. a.

1371* (German.) A Highly Elastic Magnetostrictive Material. **Ein hochelastischer magnetostriktiver Werkstoff.** O. Henkel. *Nachrichtentechnik*, v. 7, Aug. 1957, p. 346-350.

Magnetostrictive properties of bodies composed of ferromagnetic particles in a matrix of various rubber or plastic materials.

1372* Specificity of Intermolecular Forces Due to Quantum-Mechanical and Thermal Charge Fluctuations. Herbert Jehle. *National Academy of Sciences of the United States of America, Proceedings*, v. 43, Sept. 1957, p. 847-855.

Estimation of the magnitude of the interaction; biological implications.

1373 Nature of Luminescent Centers in Alkali Halide and Zinc Sulfide Phosphors. Ferd E. Williams. *Optical Society of America, Journal*, v. 47, Oct. 1957, p. 869-876.

Energy levels of the luminescent centers in alkali halides are approximated by states of the free impurity ion perturbed by crystalline interactions, whereas the levels of luminescent centers in zinc sulfide phosphors are suitably approximated by states of the crystal band structure perturbed by impurities.

1374 (English.) **The Intermediate State Structure in Cylindrical Superconductors.** John F. Cochran and Robert S. Kaeser. *Physica*, v. 23, Aug. 1957, p. 727-745.

The average magnetic moment per unit volume of a long cylinder consisting of alternate discs of superconducting and normal material was measured in a transverse magnetic field as a function of the disc thicknesses.

1375 (English.) **Nuclear Spin Relaxation in Hydrogen. III. The Solid Near the Melting Point.** Myer Bloom. *Physica*, v. 23, Aug. 1957, p. 767-780.

1376 (English.) **Theory of Induced Infra-Red Absorption.** J. Van. Kranendonk. *Physica*, v. 23, no. 9, Sept. 1957, p. 825-837.

General properties of the induced fundamental rotation-vibration bands; general expressions for the integrated absorption coefficients; density expansion for the total absorption coefficient; the intensity of definite rotational branches.

1377 Mobilities of Mercury Ions in Helium, Neon, and Argon. Lorne M. Chanin and Manfred A. Biondi. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1219-1221.

Values found are in agreement with extrapolations of the mobility vs. mass-number curves obtained for alkali ions in the noble gases by Tyndall and collaborators.

1378 Density and Viscosity of Normal Fluid in Dilute Solutions of He^3 in He^4. J. G. Dash and R. Dean Taylor. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1228-1237.

Solutions are studied from 1.3 K to the lambda point by the torsion pendulum technique.

1379 Theory of the Forbidden Transitions of Nitrogen Atoms Trapped in Solids. C. M. Herzfeld. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1239-1245.

The trapped atoms are perturbed by the solids; configuration interaction, produced by the solid, is important.

1380 Magnetic Anisotropy of Cobalt Ferrite ($Co_{1.01}Fe_{2.00}O_{3.62}$) and Nickel Cobalt Ferrite ($Ni_{0.72}Fe_{0.20}Co_{0.08}Fe_2O_4$). Henry Shenker. *Physical Review*, v. 107, ser. 2, Sept. 1, 1957, p. 1246-1249.

1381 Effects of X-Ray Irradiation on the Frequency-Temperature Behavior of *AT*-Cut Quartz Resonators. A. R. Chi. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1524-1529.

Studies on resonators fabricated from natural quartz, synthetic quartz grown on several different cuts of seed plates, and synthetic quartz containing Al or Ge as an impurity. The effect of X-ray irradiation can be removed by thermal bleaching at temperatures between 200 and 500 C for a few hrs.

1382 Electron Spin Resonance of *F* Centers in Magnesium Oxide; Confirmation of the Spin of Magnesium-25. John E. Wertz, Peteris Auzins, R. A. Weeks, and R. H. Silsbee. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1535-1537.

An electron spin resonance spectrum induced in MgO crystals by pile irradiation is interpreted as arising from *F* centers. After an oxide ion is displaced from its normal position by neutrons, an electron donated by ever-present divalent impurities may become trapped at the vacancy.

1383 Electronic Polarizabilities of Ions. R. M. Sternheimer. *Physical Review*, v. 107, ser. 2, Sept. 15, 1957, p. 1565-1569.

The dipole and quadrupole polarizabilities were calculated for several ions by solving the Schrödinger equation satisfied by the first-order perturbation of the wave functions of the electrons of the core.

1384* (Russian.) Sensitive Nuclear Magnetometer. **Chuvstvitel'nyi iadernyi magnetometr.** A. V. Kubarev. *Pribory i Tekhnika Eksperimenta*, 1957, no. 3, May-June, p. 57-60.

Nuclear magnetometer for intensity measurement of the permanent magnetic field and its non-uniformity in the limits of 260 to 1200 C is described. Nuclear resonance absorption method is used. Error is 0.02 to 0.05%.

1385 The Relativistic Gas. J. L. Synge. 108 p. 1957. Interscience Publishers, New York. (QC6 Sy75rg)

A simple gas-model is considered; it consists of point-particles (material molecules or photons) which, by elastic collisions conserving 4-momentum, take up the most probable distribution according to Maxwell-Boltzmann statistics. The statistical approach yields an equation of state and determinate macroscopic equations of motion, corresponding to adiabatic conditions.

1386 Relativistic Invariance and Quantum Phenomena. Eugene P. Wigner. *Reviews of Modern Physics*, v. 29, July 1957, p. 255-268.

Discourse on great difference between the relation of special relativity and quantum theory on one hand, and general relativity and quantum theory on the other.

1387 Dielectric Spectroscopy of Ferromagnetic Semiconductors. P. A. Miles, W. B. Westphal, and A. von Hippel. *Reviews of Modern Physics*, v. 29, July 1957, p. 279-307.

Measurement techniques; structure of ferrites; electric and magnetic spectra; spin resonance and effective field; magnetic anisotropy of crystal structure.

1388 Three Lectures on Relativity Theory. V. Fock. *Reviews of Modern Physics*, v. 29, July 1957, p. 325-333.

Homogeneity, covariance, and relativity; some approximate solutions of Einstein's equations; gravitational waves from a system of moving bodies.

1389 Papers From the Conference on the Role of Gravitation in Physics Held at the University of North Carolina, Chapel Hill, North Carolina, January 18-23, 1957. *Reviews of Modern Physics*, v. 29, July 1957, p. 351-546.

Collection of 21 papers involving current activity in the field of relativity physics.

1390* (German.) Propagation of Sounds in Gases at High Frequencies and Very Low Pressures. **Schallausbreitung in Gasen bei hohen Frequenzen und sehr niedrigen Drucken.** Erwin Meyer and Gerhard Sessler. *Zeitschrift für Physik*, v. 149, no. 1, 1957, p. 15-39.

Calculation of the sound absorption and dispersion in argon, air and H at 10^7 to 10^{11} Hz/atm. Application of the classical theory at 10^7 to 10^8 Hz/atm. Burnett's theory for higher values to 10^{10}.

1391* (Russian.) On the Intercrystalline Layers in Crystal Phosphors. **K voprosu o mezhkristallitnykh prosloikakh v kristallofosforakh.** V. F. Pisarenko. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 6, June 1957, p. 1276-1277 + 2 plates.

Shows that there are no grounds for assuming, on the basis of X-ray measurements, the presence of intercrystalline layers in crystal phosphors.

1392* (Russian.) Freezing of Drops of a Supercooled Water Fog in an Acoustic Field. **Zamerzanie kapel' pereokhlazhdennogo vodianogo tumana v akusticheskom pole.** V. V. Bazilevich and N. P. Tverskoi. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1826-1829.

Experiments to determine the effect of acoustic vibration on the freezing of fog particles. Results of experiments carried out at various temperatures below 0 C show that supercooled fog crystallizes in an acoustic field more rapidly in the temperature range between −4 and −5 C. The determining factor is the power of the radiated waves.

1393* (Russian.) On the Theory of Aberration of Electron Optical Focusing Systems With Curvilinear Axis. **K teorii aberratsii elektronnooptícheskikh fokusiruiushchikh sistem s krivolineinoi os'iu.** Iu. V. Vandakurov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 8, Aug. 1957, p. 1850-1862.

Trajectory method of derivation of an equation by means of which the geometric and chromatic aberrations of arbitrary electric and magnetic fields can be calculated.

See also: **214** (thermodynamic properties of hydrocarbons); **576** (lens design).

PLASTICS

1394* Polyvinyl Chloride Resins. I. Vinyl Polymers and Copolymers. M. S. Welling. *Adhesives & Resins*, v. 5, Sept. 1957, p. 105-110.

Deals with PVC polymers and copolymers, their history and properties, polymerization methods in use today, and the most important applications of these resins.

1395 Design Notes for Glass Reinforced Plastics. Practical Notes for the Draughtsman on the Use of Low-Pressure Laminates. J. H. Wright and R. D. Dowman. *Aircraft Engineering*, v. 29, Oct. 1957, p. 319-326.

In secondary structure plastics offer advantages in robustness and non-corrodibility over light alloys, with increase in weight, and sometimes with less weight. Examples are given.

1396 Cationic Polymerization of α-Methylstyrene. D. J. Worsfold and S. Bywater. *American Chemical Society, Journal*, v. 79, Sept. 20, 1957, p. 4917-4920.

Polymerization with a boron trifluoride-ether-water complex was studied.

1397 The Molecular Structure of Polyethylene. VI. Molecular Weight From Dissymmetry of Scattered Light. L. T. Muus and F. W. Billmeyer, Jr. **VII. Melt Viscosity and the Effect of Molecular Weight and Branching.** W. L. Peticolas and J. M. Watkins. **VIII. Number-Average Molecular Weight by Cryoscopy.** C. E. Ashby, J. S. Reitenour, and C. F. Hammer. **IX. Weight-Average Molecular Weight and Intrinsic Viscosity of Linear Polyethylene.** J. T. Atkins, L. T. Muus, C. W. Smith, and E. T. Pieski. *American Chemical Society, Journal*, v. 79, Oct. 5, 1957, p. 5079-5091.

1398 Resistance of Organic Materials and Cable Structures to Marine Biological Attack. Lloyd R. Snoke. *Bell System Technical Journal*, v. 36, Sept. 1957, p. 1095-1127.

Data on polyethylene, PVC plastics, casting resins, elastomers, and jute.

1399 Process Piping: Plastics Vie With Metals. James P. Kelleher and C. L. Mantell. *Chemical Engineering*, v. 64, Nov. 1957, p. 296 + 4 pages.

Thermoplastics offer advantages of corrosion resistance, light weight, low cost, ease of installation, self-insulating characteristics, low solids deposit tendencies, and low frictional losses. Rigid, unplasticized PVC has the best combination of engineering properties.

1400 Polyethylene: Preparation, Structure, and Properties. Sundar L. Aggarwal and Orville J. Sweeting. *Chemical Reviews*, v. 57, Aug. 1957, p. 665-742.

Reviews pertinent work published up to August 1956.

1401* (Italian.) Copolymerization of Ethylene With α-Olefins. **Copolimerizzazione dell'etilene con le α-olefine alifatiche. I.** Preliminary Studies of Ethylene-Propylene Copolymerization. **Studi preliminari della copolimerizzazione dell'etilene con il propilene.** G. Natta, G. Mazzanti, A. Valvassori, and G. Pajaro. **II.** Reactivity Ratios of Ethylene and Propylene in Copolymerization in the Presence of Vanadium Oxychloride and Aluminum Alkyl Catalysts. **Rapporti di reattività dell'etilene e propilene nella copolimerizzazione in presenza di catalizzatori ottenuti da ossicloruro di vanadio e alluminio-alchili.** G. Mazzanti, A. Valvassori, and G. Pajaro. *Chimica e l'Industria*, v. 39, Sept. 1957, p. 733-748.

1402 Thermoplastic Materials for Pipe. P. M. Elliott. *Corrosion*, v. 13, Oct. 1957, p. 647t-653t.

Polyethylene, acrylonitrile copolymer blends, cellulose acetate butyrate, PVC, and polyvinylidene chloride pipes are compared with metal pipes.

1403* (Russian.) Polymerization of Some Compounds Having Two Isopropenyl Groups. **Polimerizatsiia nekotorykh soedinenii s dvumia izopropenil'nymi gruppami.** Iu. V. Mitin and N. A. Glukhov. *Doklady Akademii Nauk SSSR*, v. 115, no. 1, July 1, 1957, p. 97-99.

Studies of bifunctional compounds to obtain linear polymers containing benzene cycles in the main chain.

1404* Composite Fluorocarbon Laminates for Printed Wiring. L. B. Allen, D. E. McElroy, and S. J. Stein. *Electrical Manufacturing*, v. 60, Oct. 1957, p. 124-126.

Copper foil is bonded by special process to a polymonochlorotrifluoroethylene film which is in turn backed by either phenolic or glass-epoxy laminate.

1405* Block Copolymers. Norman G. Gaylord. *Interchemical Review*, v. 16, Autumn 1957, p. 3-16.

Synthesis and properties of copolymers containing alternating sequences of monomeric units of varying lengths.

1406 Nuclear Magnetic Resonance, Radiation Damage, and Rigidity in Branched Polyethylene as a Function of Temperature. N. Fuschillo and J. A. Sauer. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1073-1081.

Molecular motions and microstructure are studied as a function of irradiation damage and temperature. The methods of proton magnetic resonance, specific volume and density percent crystallinity, mechanical rigidity and loss, and X-ray determined crystallinites are employed.

1407 Structure of Spherulites as Revealed by Selected-Area Electron Diffraction and Electron Microscopy. Robert G. Scott. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1089-1090.

Two-dimensional spherulites in thin films of 6-6 nylon were studied by selected-area electron diffraction. Bright- and dark-field electron microscopy.

1408 Photoelastic Properties of Polystyrene in the Glassy State. I. Effect of Molecular Orientation. R. D. Andrews and J. F. Rudd. **II. Effect of Temperature.** J. F. Rudd and E. F. Gurnee. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1091-1100.

1409 Kinetics of Spherulite Growth in High Polymers. Bruce B. Burnett and W. F. McDevit. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1101-1105.

Spherulite growth rates were measured in two polyamides, 66 and 6 nylon, at temperatures ranging from 38 to 141 C below the melting points using a moving photomicrographic technique.

1410 Tridirectional X-Ray Patterns of Oriented Film at Wide and Small Angles. W. O. Statton and Grace M. Godard. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1111-1113.

Film of polyethylene terephthalate was studied by means of an X-ray diffraction technique in which the X-ray beam was directed in three mutually perpendicular directions: through the film, in the plane of the film, parallel and normal to the direction of draw.

1411 Lattice Energy of Crystalline Polyethylene. Fred W. Billmeyer, Jr. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1114-1118.

The heat of sublimation, which is defined as the lattice energy of the crystalline phase of linear polyethylene, is 1.84 kcal. per mole of CH_2 groups. The heat of fusion of crystalline linear polyethylene is 0.9±2 kcal. per mole of CH_2 groups.

1412 Flow Birefringence and Stress. V. Correlation of Recoverable Shear Strains With Other Rheological Properties of Polymer Solutions. Wladimir Philippoff, Frederick H. Gaskins, and John G. Brodnyan. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1118-1123.

1413 Effect of Irradiation on Dynamic Mechanical Properties of 6-6 Nylon. C. W. Deeley, A. E. Woodward, and J. A. Sauer. *Journal of Applied Physics*, v. 28, Oct. 1957, p. 1124-1130.

1414 Direct Ultracentrifuge Molecular Weights of Synthetic High Polymers. Gerson Kegeles, Stanley M. Klainer, and William J. Salem. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1286-1290.

A rapid method for the direct determination of mol. wt. was applied to the polydisperse non-ideal synthetic polymer solutions. By proper selection of speed and time of centrifugation for various polymer concentrations, data is obtained which can be extrapolated to infinite dilution to obtain the weight-average mol. wt.

1415 Water Vapor Diffusion Through Vinyl Chloride-Vinyl Acetate Copolymer. C. A. Kumins, C. J. Rolle, and J. Roteman. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1290-1296.

Diffusion through unplasticized and plasticized vinyl chloride-vinyl acetate copolymers was studied above and below their second-order transition temperatures (T_g).

1416 The Interaction of Polyvinylpyrrolidone With Some Azo Dyes. H. P. Frank, S. Barkin, and F. R. Eirich. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1375-1380.

Polyvinylpyrrolidone displays strong binding affinities toward various organic anions such as the azo dyes orange II and benzopurpurin 4B. The binding equilibria were studied by a conductance method and by a dialysis technique.

1417 The Infrared Spectra of Polymers. II. The Infrared Spectra of Polyethylene Terephthalate. Marvin C. Tobin. *Journal of Physical Chemistry*, v. 61, Oct. 1957, p. 1392-1400.

The assignment of frequencies in *p*-substituted benzenes is considered, and a reasonable assignment made for *p*-dichlorobenzene. This assignment is based on the Raman spectrum and on infra-red spectra of vapor, solution, and oriented single crystal.

1418* Intrinsic Viscosity—Molecular Weight Relationship for Polychlorotrifluoroethylene. Eugene K. Walsh and Herman S. Kaufman. *Journal of Polymer Science*, v. 26, Oct. 1957, p. 1-7.

A high temperature osmotic pressure technique was used to obtain mol. wt. data on fractions of polychlorotrifluoroethylene of from 74,000 to 510,000 mol. wt.

1419* Multicomponent Polymers. I. Three-Component Systems. R. J. Slocombe. *Journal of Polymer Science*, v. 26, Oct. 1957, p. 9-22.

Forty-four terpolymer systems are reported.

1420* Polymerization of Some Fluorine-Containing Olefin Oxides. F. B. Jones, P. B. Stickney, L. E. Coleman, Jr., D. A. Rausch, and A. M. Lovelace. *Journal of Polymer Science*, v. 26, Oct. 1957, p. 81-88.

All of the polymeric products obtained from 1,1,1-trifluoro-2,3-butylene oxide were liquids of a relatively low mol. wt. The highest mol. wt. polymers were obtained using $FeCl_3$, $AlCl_3$, and BF_3 and attempts were made to determine the relative polymerizability of other, more highly substituted, fluorinated olefin oxides. These were 1,1,1-trifluoro-2,3-pentylene oxide, 1,1,1-trifluoro-2,3-isopentylene oxide, 1,1,1,2,2,3,3-heptafluoro-4,5-hexylene oxide, 1,1,1-2,2,3,3-heptafluoro-4,5-heptylene oxide, and 1,1,1,2,2,3,3-heptafluoro-4,5-isoheptylene oxide.

1421* (Russian.) Diffusion Theory of Adhesion of Copolymers to Each Other. **Diffuzionnaia teoriia adgezii sopolimerov drug k drugu.** S. S. Voiutskii. *Kauchuk i Rezina*, v. 16, no. 7, July 1957, p. 23-26.

Diffusion mechanism of chain molecules.

1422* (German.) Measurement of Dielectric Losses for Determining Reactions in the Polyvinyl Chloride-Plasticizer Systems. **Zur Messung der dielektrischen Verluste zur Bestimmung der Wechselwirkungen in Polyvinylchlorid-Weichmacher-Systemen.** H. Luther and G. Weisel. *Kolloid-Zeitschrift*, v. 154, Sept. 1957, 15-19.

1423* (German.) The Study of Adsorption Complexes of Polymers With Wetting-Agent Ions. **Die Untersuchung der Adsorptionskomplexe von Polymeren mit Netzmittelionen.** Shuji Saito. *Kolloid-Zeitschrift*, v. 154, Sept. 1957, p. 19-29.

Reaction of water-soluble polymers with wetting agents as affected by viscosity, adsorption, and the solubilization effect of dye.

1424 Teflon-Based Piston Rings for Nonlubricated Applications. Richard D. Taber and Fred A. Robbins. *Mechanical Engineering*, v. 79, Sept. 1957, p. 838-841.

Piston rings for gas and chemical-process compressors. Wear test results for K-30 material, consisting of Teflon specially compounded with fine-glass fibers.

1425 Radiation Polymerization Makes Stronger Polystyrene. E. L. Colichman and R. F. Fish. *Nucleonics*, v. 15, Oct. 1957, p. 134-137.

Studied radiation polymerization of styrene with 0 to 10% divinyl-benzene as the copolymerizing cross-linking agent at γ doses of 1.0 to 3.8 X 10^7r and temperatures of 50 to 100 C. Results indicate tensile strength improvements as high as 50%.

1426 Ionising Radiations and Polymer Chemistry. F. S. Dainton. *Oil & Colour Chemists' Association, Journal*, v. 40, Oct. 1957, p. 830-844.

Relevant principles of radiation chemistry; radiation induced polymerization; effects of ionizing radiation on unsaturated organic compounds and on saturated high mol. wt. substances.

1427* (Dutch.) Vinylacetate as a Basic Material for the Plastic Industry. **Vinylacetaat als grondstof voor de kunststoffenindustrie.** W. C. de Liefde. *Plastica*, v. 10, July 1957, p. 448-454.

History of vinylacetate. Properties. Fundamental reaction for its production. Stabilization. Monomer preparation. Polymerization and chemical technology. Copolymers. Applications.

1428* (Dutch.) Structural Analysis of Nylon-6 and Other Polyamides. **Structuuronderzoek van Nylon-6 en andere polyamiden. III.** J. Ch. F. Kessler. *Plastica*, v. 10, Sept. 1957, p. 604-611.

Effect of raw material grain size, shape, and distribution on structure and other characteristics of extruded products.

1429* (German.) Kinetics of the Mixed Polymerization of Styrene and Acenaphthylene. **Zur Kinetik der Mischpolymerisation von Styrol und Acenaphthylen.** Kurt Ueberreiter and Wolfgang Krull. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 12, nos. 5-6, Sept. 1957, p. 303-320.

A study of thermally excited mixed polymerization in homogeneous phase at 90 C.

1430* (Russian.) On the Flow Mechanism of Polyvinyl Chloride. **O mekhanizme tekuchesti polivinilkhlorida.** V. A. Kargin and T. I. Sogolova. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 6, June 1957, p. 1328-1336.

The breaking-up process in the polymers is opposed by a structuralizing effect due to free radicals formed during disruption of the polymer chains.

1431* (Russian.) Effect of Low Molecular Weight Compounds on Photochemical Destruction of Polystyrene. **Vliianie nizkomolekuliarnykh soedinenii na fotokhimicheskuiu destruktsiiu polistirola.** V. V. Korshak, K. K. Mozgova, and A. P. Zasechkina. *Zhurnal Obshchei Khimii*, v. 27, no. 7, July 1957, p. 1866-1873.

Studying the destructive effect of ultra-violet radiation on polystyrene. Addition of 1,4-diphenyl-1,3-butadiene to polystyrene slows down the process.

1432* (Russian.) Synthesis and Polymerization of Methoxy Substitutes in the Styrene Nucleus. **Sintez i polimerizatsiia metoksizameshchennykh (v iadre) stirolov. I.** Synthesis and Polymerization of Monomethoxystyrenes. **Sintez i polimerizatsiia monometoksistirolov. II.** Synthesis and Polymerization of Dimethoxystyrenes. **Sintez i polimerizatsiia dimetoksistirolov.** N. P. Zapevalova and M. M. Koton. *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2138-2145.

1433* (Russian.) Reaction of Free Radicals in Solutions. **Reaktsii svobodnykh radikalov v rastvorakh. X.** Inhibitive Action of Polyphenols and Aromatic Amines on Styrene Polymerization. **Mekhanizm ingibiruiushchego deistviia polifenolov i aromaticheskikh aminov na protsess polimerizatsii stirola.** *Zhurnal Obshchei Khimii*, v. 27, no. 8, Aug. 1957, p. 2226-2232.

As a result of experiments it was concluded that aromatic amines and polyphenols do not inhibit the thermal polymerization of styrene. They act as inhibitors only in systems containing O or salts of metals with changeable valence.

1434* (Russian.) Preparation of Three-Dimensional Polymers of Alkylacrylates and Alkylmethacrylates, and a Study of Their Properties. **Poluchenie i issledovanie svoistv trekhmernykh polimerov alkilakrilatov i alkilmetakrilatov.** A. Ia. Drinberg and A. D. Iakovlev. *Zhurnal Prikladnoi Khimii*, v. 30, no. 8, Aug. 1957, p. 1204-1214.

Preparation of the polymers by heating polyethers of the acrylic and methacrylic series at 160 to 200 C in the presence of air.

See also: **86** (depolymerization of natural polymers); **267** (analysis of polymer mixtures); **325** (urea-formaldehyde reaction); **524** (bonding of polyethylene to metal); **746** (plastics products survey); **779** (plastics for meat packaging); **884** (plastic ball bearings); **1467** (polyethylene rubber mixtures); **1472** (punched card sorter for polymer compounding).

POLLUTION AND WASTES

1435* **Safe Design and Use of Spray Booths With Paint Filters.** Sidney Marlow. *Air Conditioning, Heating, and Ventilating*, v. 54, Oct. 1957, p. 83-87.

Includes data on types of paint filters commercially available, installation of the filter bank, filter area required, the necessary air-flow interlocks, the loaded filter resistance, and maintenance and replacement of the filters.

1436 The Disposal of Liquor From Producer Gas Plants. K. J. Sagar. *British Coal Utilisation Research Association, Monthly Bulletin*, v. 21, Aug. 1957, p. 321-335.

Production, composition, polluting effects, reduction of volume, reduction of polluting constituents, disposal, and treatment of liquor before discharge to sewers or rivers. Legal aspects of the gas liquor problem.

1437 Progress Report on Waste Processing Development Project. Development of a Waste Calciner. B. Manowitz and S. Zwickler. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL-447 (T-95), Apr. 1957, 8 p. (UF767 Un3.1bn Contin.)

The "continuous calciner" is a heated-tube auger-agitated concentrator which dehydrates and fuses the various aqueous salt solutions to an anhydrous free-flowing melt on a continuous basis.

1438 Separation of Cesium and Strontium From Calcined Metal Oxides as a Process in Disposal of High Level Wastes. A. Abriss, J. J. Reilly, and E. J. Tuthill. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL-453 (T-97), Apr. 1957, 8 p. (UF767 Un3.1bn Contin.)

1439 Venturi Scrubber in Odor Control. J. F. Byrd and E. L. Dewey. *Chemical Engineering Progress*, v. 53, Sept. 1957, p. 447-451.

Case example of a commercial scrubber used with a mildly odorous process-exhaust gas containing entrained product fines.

1440 Treatment of Gaseous Effluents. W. C. Schmidt. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-49549A, Apr. 1957, 26 p. (UF767 Un3.1hw Contin.)

Equipment and procedures for the removal of noxious radioactive waste gases from chemical processing facilities.

1441 High Level Alpha Air Monitor. G. D. Linsey and R. A. Harvey. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-49561, June 1957, 25 p. (UF767 Un3.1hw Contin.)

A simple and reliable device for the detection of airborne Pu.

1442 Removal of Radioactive Contaminants From Water by Ion Exchange Slurry. William J. Lacy and Don C. Lindsten. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1725-1726.

Radioactive contaminants were removed from water by slurrying with commercially available ion exchange resins. After agitation, radioactive ions that were in solution are attached to the resin and settle out with it.

1443 A Treatment for Oily Waste Water. III. W. B. Hart. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 97A + 2 pages.

Flocculation unit; precipitating agent; pH control; chemical treatment and preparation; sludge removal and disposal.

1444 Dust Control. Particulate Matter and Methods of Removal. *Iron & Steel*, v. 30, Oct. 9, 1957, p. 536-541.

Sources, control, and removal of dust in metallurgical work. Equipment, performance, and cost data.

1445 Dust Problems of the Iron and Steel Industry. M. W. Thring and R. J. Sarjant. *Iron & Steel*, v. 30, Oct. 9, 1957, p. 571 + 4 pages.

1446 Science for Electroplaters. XXIX. Cyanide Disposal Methods. L. Serota. *Metal Finishing*, v. 55, Oct. 1957, p. 75 + 3 pages.

1447* Effluent Treatment. Precipitation - Ion Exchange Methods. K. G. Seedhouse. *Nuclear Engineering*, v. 2, Oct. 1957, p. 413-417.

An account of work aimed at achieving greater radioactive decontamination factors than present large-scale methods, at the lowest possible cost.

1448 Calcination of Aluminum-Type Reactor Fuel Wastes in a Fluidized Bed. E. S. Grimmett. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14416, Aug. 1957, 16 p. (UF767 Un3.1id Contin.)

Conversion of such fuel wastes into a free-flowing granular Al oxide solid by means of a fluidized bed calciner was studied.

1449* (Czech.) The Removal of Phenols From Waste Water by Humic Acids. **Zachycení fenolů z odpadních vod huminovými látkami.** Jiří Vodička. *Práce Ústavu pro Výzkum a Využití Paliv*, v. 8, nos. 17-26, 1957, p. 163-187.

Process is able to remove all organic matter dissolved or suspended in water.

1450* Hypochlorination of Sewage. Clair N. Sawyer. *Sewage and Industrial Wastes*, v. 29, Sept. 1957, p. 978-986.

Sewage Cl requirements will be less for hypochlorites than for liquid Cl, due to a much lower Cl demand when hypochlorites are used.

1451* Ion Exchange Treatment of Industrial Wastes. Charles G. Bueltman. *Sewage and Industrial Wastes*, v. 29, Sept. 1957, p. 1018-1023.

Explains applications in the metal finishing industry, and cites other possibilities.

1452* Industrial Waste Control in the General Motors Corporation. Lynn Davies. *Sewage and Industrial Wastes*, v. 29, Sept. 1957, p. 1024-1032.

Waste prevention as a protector of water resources and as an economic asset.

1453* Determination of Stream Purification Capacity. B. F. Lueck, A. J. Wiley, Ralph H. Scott, and T. F. Wisniewski. *Sewage and Industrial Wastes*, v. 29, Sept. 1957, p. 1054-1065.

Proposes a generalized definition.

1454* Biocatalytic Additives in Sludge Digestion. E. A. Pearson, et al. *Sewage and Industrial Wastes*, v. 29, Sept. 1957, p. 1066-1074.

Concludes that the biocatalytic additives tested had no significant beneficial effect on sludge digestion for grease liquefaction.

1455* Activated Sludge Treatment of Kraft and Neutral Sulfite Mill Wastes. Ben V. Pearman, Jr. and Oliver B. Burns, Jr. *Sewage and Industrial Wastes*, v. 29, Oct. 1957, p. 1145-1154.

Supplemented activated sludge process successfully treats kraft and neutral sulfite mill wastes.

1456* Liquid Wastes Control at the General Electric Company Research Laboratory. V. deP. Lukas and H. M. Ottaway. *Sewage and Industrial Wastes*, v. 29, Oct. 1957, p. 1166-1173.

Hazards in liquid waste from research laboratories are evaluated and eliminated.

1457* Characteristics of a Stream Composed of Oil Refinery and Activated Sludge Effluents. F. J. Ludzack, Wm. Marcus Ingram, and M. B. Ettinger. *Sewage and Industrial Wastes*, v. 29, Oct. 1957, p. 1177-1189.

1458 The Denver Area Air Pollution Problem. *U. S. Department of Health, Education, and Welfare, Public Health Service, June* 1957, 78 p. (TD884 Un3.67d Over.)

General consideration of available information relative to the present and possible future atmospheric pollution situation, including types of activity which cause pollution, evidences of pollution levels, meteorological and topographical influences on dispersion of pollutants, existing or authorized governmental activity for control of pollution, and other relevant community characteristics.

See also: **228** (particulate clouds: dusts, smokes, and mists); **819** (smog control by weather modification).

RUBBER AND ELASTOMERS

1459* (Russian.) Influence of the Chemical Nature of the Solvent on the Oxidation of Rubber in Solutions. **Vliianie khimicheskoi prirody rastvoritelei na okislenie kauchuka v rastvorakh.** T. G. Degteva and A. S. Kuz'minskii. *Doklady Akademii Nauk SSSR*, v. 115, no. 2, July 11, 1957, p. 339-342.

Effect of the following solvents on purified sodium-butadiene rubber: aromatic (benzene, toluene, xylol, ethylbenzene, and isopropylbenzene), naphthene, and naphthene-aromatic (decalin and tetralin) hydrocarbons.

1460 Silicone Rubber as a Selective Barrier. Gas and Vapor Transfer. Karl Kammermeyer. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1685-1686.

Permeabilities for all gases tested were about ten to a hundred times as great as similar permeabilities reported for other plastic films.

1461 Vinylidene Fluoride-Hexafluoropropylene Copolymer. A Thermally Stable Elastomer. Stanley Dixon, D. R. Rexford, and J. S. Rugg. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1687-1690.

Various methods of cross linking of Viton A, a synthetic rubber product, are described. Product shows a very high order of resistance to the effects of heat and chemicals and is resistant to the swelling action of hot lubricants, fuels, and hydraulic fluids.

1462 Formation of Microgel During Accelerated Aging of Neoprene Latex. Kurt L. Seligman. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1709-1712.

Work was undertaken to correlate the milling and tensile properties of polychloroprenes with the microgel content of the polymer. Increasing amounts of microgel increase the Mooney viscosity of the raw polymer and the modulus of vulcanizates.

1463 Oxidation Rate Measurements of Hevea Rubber Vulcanizates. A. G. Veith. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1775-1778.

1464 Rubberized Bituminous Materials and Their Use in Road Construction. W. D. Parker and W. D. C. Walker. *Journal of Applied Chemistry*, v. 7, Sept. 1957, p. 481-491.

Compatibility of natural and synthetic rubbers and polymers such as PVC with coal tar pitches and bitumens. The penetration/softening point and penetration/temperature characteristics of a range of modified compositions in relation to those of residual and blown bitumens and of coal tar pitches. Test for assessing brittleness.

1465* (German.) Vulcanization of Highly Elastic Polymers. **Zur Kenntnis der Vulkanisation hochelastischer Polymerisate. XVI.** Vulcanization of Natural and Synthetic Rubber With Sulfur in the Presence of Dithiocarbaminates. **Die Vulkanisation des Naturkautschuks und der synthetischen Kautschuke durch Schwefel bei Anwesenheit von Dithiocarbaminaten.** Walter Scheele and Klaus Birghan. *Kautschuk und Gummi*, v. 10, Sept. 1957, p. 214WT-222WT.

Kinetics of the vulcanization of natural rubber with S. Action of different amounts of zinc diethyldithiocarbaminate in relation to temperature.

1466* (German.) Arctic Rubber. **Arktischer Gummi.** F. J. Ritter. *Kautschuk und Gummi*, v. 10, Sept. 1957, p. 222WT-227WT.

Studies to improve the low temperature properties of natural rubber by addition of thiol acids.

1467 Application of Low Molecular Weight Polyethylene in Rubber Compounding. T. A. Bulifant. *Rubber Age*, v. 82, Oct. 1957, p. 89-95.

Data on a new class of ingredients for improving processibility and vulcanizate properties.

1468 Castable Elastomers Based on Diisocyanates and Polyether Glycols. L. A. Dickinson. *Rubber Age*, v. 82, Oct. 1957, p. 96-101.

A report on the physical properties of experimental formulations.

1469 Viton A. A New Fluorine-Containing Rubber. J. S. Rugg and A. C. Stevenson. *Rubber Age*, v. 82, Oct. 1957, p. 102-104.

Introduction of a polymer notable for its heat resistance, chemical stability, and mechanical properties.

1470* Radiation Effects in Elastomeric Vulcanizates. B. L. Johnson, H. E. Adams, and Marie Barzan. *Rubber World*, v. 137, Oct. 1957, p. 73 + 6 pages.

Effects of γ radiation on the physical properties of treated-type vulcanizates of natural and synthetic rubbers were evaluated by standard test methods over a temperature range from 73 to 500 F. Natural rubber is indicated to be the best for usage as a general-purpose elastomer.

1471* A Constant Torque Abrasion Machine With a Permanent Abrasive Surface. Ira Williams. *Rubber World*, v. 137, Oct. 1957, p. 78-83.

Grasselli Du Pont abrader was modified to provide variable speed and to operate at a constant torque. The abrasive service is a metal disk with SiC sparsely bonded with modified epoxy resin.

1472* Electronically Sorted Punched Cards for Polymer Compounding Data. Robert F. Neu. *Rubber World*, v. 137, Oct. 1957, p. 84-90.

Description of compact, efficient, punched-card technical data filing and sorting system. An electronic statistical machine is used in the system. Suggestions for the design of card and data report forms are included.

1473* Continuous Vulcanization of Butyl Insulated High Voltage Cable. A. L. Rosener, Jr. *Wire and Wire Products*, v. 32, Oct. 1957, p. 1188 + 6 pages.

Production methods; curing relationships; physical properties.

See also: **527** (elastomer-based coatings); **585** (aging of rubber-insulated cables); **897** (permeability of rubber-like vacuum shaft seals).

SPACE HEATING AND CONDITIONING

1474* Solar Energy Used to Supply Service Hot Water. E. A. Farber, W. H. Bussell, and J. D. Bennett. *Air Conditioning, Heating, and Ventilating*, v. 54, Oct. 1957, p. 75-79.

Data on availability of sunshine in the U. S., what can be expected from a good solar water heating installation, effect of multiple glass covers on the absorber, heat losses, how much energy the water can be expected to absorb, and a comparison of the costs of heating water by solar energy, gas, and electricity.

1475* Heavy Intra-Porous Gas Reduces Refrigerator Insulation Needs. W. H. Emerson and L. A. Staebler. *Refrigerating Engineering*, v. 65, Oct. 1957, p. 33 + 5 pages.

The conductivity of some mineral wool insulations can be halved by replacing the air within the material by a heavy gas such as Refrigerant 12. Various methods for retaining Refrigerant 12 in a batt of insulation are discussed and special consideration is given to a method which employs a plastic envelope. Effects of air dilution on conductivity and methods for restricting it to a tolerable level are described.

1476* Refrigeration Techniques and Apparatus for Very Low Temperatures (to 4.2K). E. T. Wessel. *Refrigerating Engineering*, v. 65, Oct. 1957, p. 37-45.

One system uses liquid N as the refrigerant and is capable of producing temperatures in the range from 75 to −320 F. A second system which employs liquid He as the refrigerant is used for the temperature range from −320 F to −452 F.

See also: **652** (cooling of electronic equipment).

TEXTILES, FIBERS, LEATHER, AND PAPER

1477* (English.) **The Presence of Cinnamyl Alcohol Groups in Lignin.** Bengt O. Lindgren and Hiroshi Mikawa. *Acta Chemica Scandinavica*, v. 11, no. 5, 1957, p. 826-835.

Color reaction was worked out which involves a transformation of groups into *p*-dimethylamino-anilides of styryl-glyoxylonitriles; this method was used for detection of the alcohol groups.

1478* (English.) **Investigations on the Sizing Effect by Means of Sized Cotton Rovings.** M. Zilahi and I. Kelen. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 1-2, 1957, p. 37-54.

Effect of starch concentration, size temperature, and repeated sizing examined. Resistance to abrasion is a sensitive index of the efficacy of sizing.

1479* Design of a Luster-Meter for Quality Control. T. M. Smith, H. A. Thompson, and W. I. Kaye. *American Dyestuff Reporter*, v. 46, Oct. 7, 1957, p. 725-730.

Design of an electronic device for measuring the comparative luster of yarns.

1480* With Glycerine From Fiber to Fabric. I. Eva A. Parolla and Carl Z. Draves. *American Dyestuff Reporter*, v. 46, Oct. 21, 1957, p. 761-769.

A review of economics, properties, and applications of glycerine in the textile industry.

1481 Fungicidal Effectiveness of Compounds Applied to Leather. Sverre Dahl and Arthur M. Kaplan. *American Leather Chemists Association, Journal*, v. 52, Oct. 1957, p. 536-549.

Test results on 126 compounds screened as leather fungicides.

1482 A New Approach to Leather Lubrication. George H. von Fuchs. *American Leather Chemists Association, Journal*, v. 52, Oct. 1957, p. 550-559.

The primary function of a leather lubricant is to prevent the adhesion between the leather fibers that takes place when wet leather is dried. Effective lubrication can be attained by coating the fibers with relatively small amounts of strongly polar lubricants.

1483 The Use of Acrylates in Aluminum Tanning. C. W. Beebe, W. F. Happich, F. P. Luvisi, and M. V. Hannigan. *American Leather Chemists Association, Journal*, v. 52, Oct. 1957, p. 560-565.

The fixation of Al_2O_3 in alum leather can be greatly increased by treatment with acrylates. The leather produced is white, flexible, full, and of high strength as measured by stitch tear resistance.

1484* (Russian.) On the Question of the Reactionability of Viscose Cellulose. **K voprosu o reaktsionnoi sposobnosti viskoznoi tselliulozy.** Z. A. Rogovin. *Bumazhnaia Promyshlennost'*, v. 32, no. 7, July 1957, p. 2-5.

Describes the behavior of cellulose under various treatments and the effect of those treatments on reactivity of viscose cellulose. Various treatments can increase or decrease reactivity, depending on the character of applied reagent and conditions of the treatment. Most effective treatment of cellulose is mechanical disintegration.

1485* (Russian.) Preparation of High Quality Viscose Cellulose. **K voprosu o poluchenii vysokokachestvennoi viskoznoi tselliulozy.** F. P. Komarov. *Bumazhnaia Promyshlennost'*, v. 32, no. 8, Aug. 1957, p. 2-5.

Requiremets for preparation of unbleached sulfite pulp from which a high quality viscose could be obtained.

1486* (Russian.) The Use of Carbon-Graphite Materials in the Cellulose-Paper Industry. **Primenenie uglegrafitovykh materialov v tselliulozno-bumazhnoi promyshlennosti.** I. Ia. Klinov, T. L. Fabrikant, and V. P. Myl'nikov. *Bumazhnaia Promyshlennost'*, v. 32, no. 8, Aug. 1957, p. 6-8.

Chemical stability of these materials, their high heat conductivity, and easy machining offer advantages for extensive use in the paper industry.

1487 Uses of Radioisotopes in the Textile Industry. A Selected Bibliography. L. L. Covert. *National Research Council, Ottawa, Technical Information Service Report No. 54*, Sept. 1957, 8 p. (Tl N21.27t Vis.)

1488 Non-Woven Fabrics. William P. Welch. *Rubber Age*, v. 82, Oct. 1957, p. 83-88.

Practical information on the manufacturing processes, including the use of lattices as binders.

1489* Investigations on Bating. IV. The Improvement in Rating Activity of a Bate Liquor With Continuous Partial Re-Use. V. The Influence of Lime Blast on Bating and Scudding. VI. The Influence of Colloidal Enzyme Adsorbents. G. H. Green. *Society of Leather Trades' Chemists, Journal*, v. 41, Sept. 1957, p. 303-324.

1490* The Permanganate Consumption of Pulp Materials. I. Development of a Basic Procedure. II. The KAPPA Number. III. The Relationship of the KAPPA Number to the Lignin Content of Pulp Materials. J. E. Tasman and V. Berzins. *Tappi*, v. 40, Sept. 1957, p. 691-704.

1491* The Internal Treatment of Paper With Polyvinyl Acetate. III. The Effect of Particle Size and Additives. W. J. Andrews, R. P. Barber, R. W. Reiter, and V. Stannett. *Tappi*, v. 40, Sept. 1957, p. 744-749.

Different particle sizes had no major advantage, but surfactants used in emulsion preparation detracted from paper strength properties.

1492* H_2O_2 for Oxidizing Vats. *Textile Industries*, v. 121, Oct. 1957, p. 104-108.

Use of peroxygen chemicals for oxidizing vat dyes on cotton and synthetics.

1493* Weave Cotton Goods 200% Faster? *Textile Industries*, v. 121, Oct. 1957, p. 115-118.

A new British shuttleless loom is reported to weave double cloth at 380 picks per min. in a 64-in. reed space.

1494* Warp Sizing. XVIII. Paul V. Seydel. *Textile Industries*, v. 121, Oct. 1957, p. 130 + 7 pages.

Discusses anti-stick rolls, hoods, multi-cylinder slashers, hot-air dryers, cooling fans, measuring rolls, and split rods.

1495 Automatic Control of the Application of Sizing and Finishing Substances in Continuous Wet Processing. Eric H. Jones. *Textile Institute, Journal, (Proceedings)*, v. 48, Sept. 1957, p. P569-P590.

The unknown effects of variations in the absorbency of the material, in the properties of the liquor, and in the conditions imposed by the machine used to apply the liquor make control difficult. The effect of these and other variables can be completely compensated for automatically and continuously by the systems of control described.

1496 The Action of Chlorous Acid on Hydrocelluloses. G. F. Davidson and T. P. Nevell. *Textile Institute, Journal (Transactions)*, v. 48, Sept. 1957, p. T356-T361.

Treatment with acidified chlorite solutions diminishes reducing power (copper number) and increases carboxyl content, but it is not possible to eliminate the reducing power completely by such treatment. Quantitative conversion of the aldehyde groups in hydrocelluloses to carboxyl groups cannot be effected by means of chlorous acid.

1497* The Significance of Wool Fiber Crimp. I. A Study on the Worsted System. J. Menkart and Jeanne C. Detenbeck. *Textile Research Journal*, v. 27, Sept. 1957, p. 665-689.

Greater crimp content between two matched batches of Merino wool showed better fabric performance.

1498* A Method for Studying the Deformation of Fabrics in Creasing. Richard Steele. *Textile Research Journal*, v. 27, Sept. 1957, p. 695-700.

1499* Zefran. G. W. Stanton. *Textile Research Journal*, v. 27, Sept. 1957, p. 703-712.

Zefran, classified as a nitrile alloy fiber, is scheduled for commercial production by the Dow Chemical Company early in 1958.

1500* Orlon Acrylic Fiber. W. W. Heckert. *Textile Research Journal*, v. 27, Sept. 1957, p. 719-725.

This modern polyacrylonitrile fiber with excellent whiteness, is slightly modified to give it high affinity for basic dyes.

1501* Darlan—The First Dinitrile Fiber. Richard D. Smith. *Textile Research Journal*, v. 27, Sept. 1957, p. 730-737.

Properties and prospects. No market development plan for this fiber is now proposed.

1502* Verel—Eastman's Modified Acrylic Fiber. H. W. Coover, Jr., W. R. Ivey, W. C. Wooten, and R. T. Crawford. *Textile Research Journal*, v. 27, Sept. 1957, p. 745-750.

Whiteness, good chemical resistance, excellent moth and mildew resistance, good strength, and excellent weatherability of Verel are considered.

1503* The Supercontraction of Wool in Solutions of Lithium Salts. June Griffith and A. E. Alexander. *Textile Research Journal*, v. 27, Oct. 1957, p. 755-767.

Purity of LiBr is of considerable importance, traces of Br in the solution having a profound effect.

1504* Properties of Wool Modified With Difunctional Isocyanates. J. E. Moore and R. A. O'Connell. *Textile Research Journal*, v. 27, Oct. 1957, p. 783-787.

Reaction with toluene-2,4-diisocyanate and hexamethylene diisocyanate. Fabric stiffness and crease recovery are only slightly affected.

1505* Evaluation of Soil Removal From Cotton Fabrics. W. J. Diamond and H. Levin. *Textile Research Journal*, v. 27, Oct. 1957, p. 787-795.

Characteristics of a soil-fiber complex which are critically important to valid comparison of the relative soil removal abilities of washing machines and detergents.

1506* The Heat Transmission of Fabrics in Wind. C. D. Niven. *Textile Research Journal*, v. 27, Oct. 1957, p. 808-811.

Shows that when a sample of overcoating material has a high permeability to air and does not lie close to the hot plate, there is a very marked difference between the results obtained with a wind blowing parallel to the surface and those with the wind striking the surface at 45°.

See also: **161** (biological decomposition of lignin); **777** (wood smoke); **1416** (interaction of PVP with azo dyes); **1455** (treatment of papermill wastes).

WELDING AND JOINING

1507 Brazing Filler Metal. *American Machinist*, v. 101, Oct. 7, 1957, p. 147 + 2 pages.

Application data for seven classifications of brazing materials and brazing-range temperatures for 29 alloys.

1508* (German.) A Contribution to the Evaluation of Welding Defects on the Basis of X-Ray Pictures and Tensile Stress Tests on Welded Samples. **Beitrag zur Bewertung von Schweissfehlern auf Grund von Röntgenaufnahmen und Zugschwellversuchen an geschweissten Proben.** Hermann Möller and Max Hampel. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 531-541.

1509* (English.) **The Works Engineer's Approach to Welding.** F. H. Dorney. *Australasian Engineer*, v. 50, Aug. 1957, p. 52-59.

Welding processes used on most common metals; personnel; equipment; analysis of production costs.

1510 On the Mechanism of Hot Cracking of Welds. V. A. Toropov. *Henry Brutcher Translation No.* 3982, 10 p. (From *Metallovedenie i Obrabotka Metallov*, no. 6, June 1957, p. 54-58.) Henry Brutcher, Altadena, Calif.

Critical literature review of dependence of resistance of weld metal to hot cracking upon temperature and nature of solidification of the constituents making up the intergranular substance; limitations to this relationship.

1511* Joining Mild Steel? How to Select the Right Electrode. C. Cambell. *Canadian Metalworking*, v. 20, Sept. 1957, p. 48 + 3 pages.

All joints can be classified as requiring fast freeze, fast follow, or fast fill electrodes.

1512* (German.) Welding and Cutting. Known and Unknown Data, Especially as Regards the Technique of Corrosion. **Schweissen und Schneiden. Bekanntes und Unbekanntes, besonders in korrosionstechnischer Beziehung.** Bruno Waeser. *Chemiker-Zeitung*, v. 81, Sept. 25, 1957, p. 612-615.

Survey of the modern welding and gas cutting techniques. Weldability of different metals. Choice of welding method. Some common errors. Testing the strength of welding seams. Brittle fracture.

1513* (Spanish.) A Contribution to the Study of the Control of the Tension, Intensity, Stress, and Time Parameters in Spot Welding. **Contribucion al estudio del control de los parametros tension, intensidad, esfuerzo y tiempo, en soldeo por resistencia por puntos.** M. Evrard and C. Haslé. *Ciencia y Técnica de la Soldadura*, v. 7, no. 37, July-Aug. 1957, 5 p.

Use of the oscillograph. Definition and determination of each parameter.

1514* What the Russians Are Doing With Welding. Henry Brutcher. *Industry & Welding*, v. 30, Oct. 1957, p. 48 + 4 pages.

Describes "magnetographic" inspection on magnetic tape and CO_2 shielded weldings with consumable electrode.

1515* Welding Know-How Makes a Tough Job Easy. *Industry & Welding*, v. 30, Oct. 1957, p. 52 + 5 pages.

Thirteen different kinds of steel are used in making this 5-in. thick weld in reactors used in a large catalytic reformer.

1516* Preheating: Where and How to Use It. H. J. Nichols. *Industry & Welding*, v. 30, Oct. 1957, p. 80 + 2 pages.

Pointers on welding carbon or alloy steel.

1517 Multi-Head Spot Welding of Car Bodies. *Machinery Lloyd (Overseas Ed.)*, v. 29, Sept. 14, 1957, p. 89-90.

1518* (Russian.) The Effect of Titanium and Nitrogen on Structure and Properties of Welded Joints of Thin Sheets of High Chromium Steel. **Vliianie titana i azota na strukturu i svoistva svarnogo soedineniia tonkolistovoi vysokokhromistoi stali.** D. A. Odesskii and V. M. Vozdvizhenskii. *Metallovedenie i Obrabotka Metallov*, 1957, no. 9, Sept., p. 42-46.

1519* (Polish.) Welding by Friction. **Spawanie przy pomocy tarcia.** Jerzy Orłowski. *Przeglad Techniczny*, v. 78, no. 17, Sept. 1957, p. 668-669.

Production of the welding heat by friction. Smoothness of surface. Esser diagrams. Choice of steel. Application to the welding of rod, rolled material, and high-speed steel.

1520* (French.) The Effect of Welding of Aluminum Alloys on Their Use in Ship-Building. **L'influence du soudage des alliages d'aluminium sur leur emploi dans la construction navale.** H. E. Jaeger. *Revue de la Soudure (Brussels)*, v. 13, no. 3, 1957, p. 151-162.

Advantages in using light alloys in ship building, including weight and resistance to corrosion. Different types of alloys used. Welding problems. Comparison with steel structures. Applications.

1521* (French.) The Hydrogen Content of Mild Steel Welds as a Function of Some Working Conditions. **La teneur en hydrogène des soudures d'acier doux en fonction de quelques conditions d'exécution.** Marcel Lefevre. *Revue de la Soudure (Brussels)*, v. 13, no. 3, 1957, p. 189-194.

A study of the factors causing a variation of H content in welds such as moisture in rod coatings and in the atmosphere during welding. Thermal conditions. Natural and thermal degasification.

1522* (German.) Experiences Gained With Basic Electrodes in Finland. **Erfahrungen mit basischen Elektroden in Finnland.** Olavi Eiro. *Schweissen und Schneiden*, v. 9, Aug. 1957, p. 379-381.

Notch impact strength values; construction of welds for sulfate cellulose boilers; treatment of welds subjected to sea water.

1523* (German.) Rationalization in Flame Soldering. **Rationalisierung in der Flammen-Löttechnik.** H. H. Grix. *Schweissen und Schneiden*, v. 9, Aug. 1957, p. 381-385.

Testing of solders and their fluxes. Design of soldered joints. Automatic and semiautomatic soldering devices.

1524* (German.) Fish Eyes in Steel Welds. **Fischaugen in Stahlschweissen.** W. Hummitzsch. *Schweissen und Schneiden*, v. 9, Aug. 1957, p. 386-390.

Causes; inspection by ultrasonic testing. Reduction of H content in welds.

1525* (German.) The Metallurgical Aspects of Welding Heat Resistant 12% Cr+Mo-V-W Alloyed Steels. **Die Metallurgie des Schweissen warmfester 12% iger Cr+Mo-V-W legierter Stähle.** E. Kauhausen and P. Kaesmacher. *Schweissen und Schneiden*, v. 9, Sept. 1957, p. 414-419.

Properties of heat resistant 12% Cr steels for use at temperatures up to 580 C. Welding conditions for Co-alloyed basic lime electrodes.

1526* (Russian.) Electro-Slag Welding With Magnetic Welding Attachment. **Elektroshlakovaia svaska magnitno-shagaiushchimi apparatami.** M. M. Fikshis. *Stanki i Instrument*, v. 28, no. 8, Aug. 1957, p. 29-32.

Development of a new method of electro slag welding with a moving attachment for welding "T" and corner joints. Design and technology of "walking" attachment type A-501. Procedure and technology of new method of welding of various joint types and its advantages.

1527* (Russian.) New Compositions of Fluxes With Calcium-Magnesium Base. **Novye sostavy keramicheskikh fliusov na izvestkovo-magnezial'noi osnove.** D. M. Kushnerev. *Svarochnoe Proizvodstvo*, 1957, no. 9, Sept., p. 1-4.

Development of various ceramic fluxes containing inexpensive and easily available components. Results of experiments show that application of the CaO-MgO-CaF_2-SiO_2-system gives a highly basic flux using easily available materials characterized by stability of the composition.

1528* (Russian.) On the Arc Welding of Gray Iron With Cast Iron Electrodes. **O dugovoi svarke serogo chuguna chugunnymi elektrodami.** S. M. Lashchiver. *Svarochnoe Proizvodstvo*, 1957, no. 9, Sept., p. 16-19.

Effect of welding conditions and of cooling speed on the structure and hardness of welded joints in gray iron. Method of calculation of welding conditions to obtain desired mechanical properties of welded joints. Method is based on relationships between the structure of the heat affected zone and the rate of cooling in temperature region of low stability of austenite; and between cooling speed and welding conditions.

1529* (Russian.) Welding. of Metals by Friction. **Svarka metallov treniem.** V. I. Vill'. *Svarochnoe Proizvodstvo*, 1957, no. 9, Sept., p. 19-23.

Some results of a study on the theory of welding by friction, development of technological conditions of welding of various metals and of necessary special equipment. The basic advantages of welding by friction are low consumption of energy and power, simplicity of installation, and ease of automation.

1530* (Russian.) Machine for Butt Welding by Friction, Type-MCT-1. **Mashina tipa MCT-1 dlia stykovoi svarki treniem.** M. M. Sheizman. *Svarochnoe Proizvodstvo*, 1957, no. 9, Sept., p. 23-24.

Basic data, design and operation of equipment for friction butt welding of round high-speed steel, stainless steel, carbon steel, and non-ferrous bars.

1531* (Russian.) Flux Containing Iron Powder. **Keramicheskii flius s zheleznym poroshkom.** A. S. Chesnokov. *Svarochnoe Proizvodstvo*, 1957, no. 9, Sept., p. 30-31.

Manufacture of FKZh-4 flux, containing (in %): 38 Ti concentrate, 8 granite, 14 fluorspar, 12 electric furnace ferromanganese, 8 ferrosilicon, and 20 iron powder.

1532 Brazing for Greater Productivity. I. G. M. A. Blanc and Rene D. Wasserman. *Welding Engineer*, v. 42, Oct. 1957, p. 42-44.

Relationship between cost of a Cu-Zn-Ag filler metal and its performance.

1533 Filler Metals for Joining. Orville T. Barnett. *Welding Engineer*, v. 42, Oct. 1957, p. 56 + 3 pages.

Processes used and problems encountered in welding Al and its alloys.

1534 Shielding Gases for Inert-Gas Welding. W. H. Helmbrecht and G. W. Oyler. *Welding Journal*, v. 36, Oct. 1957, p. 969-979.

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1537 Stress Relieving of Weldments. Earl R. Parker. *Welding Journal*, v. 36, Oct. 1957, p. 433s-440s.

Origin, nature and effect of residual stresses; influences of thermal and mechanical stress-relieving treatments on the service performance of welded structures.

1538 High-Temperature Brazing of Aluminum Bronze to Inconel. Donald Caplan and Ernest F. Nippes. *Welding Journal*, v. 36, Oct. 1957, p. 457s-464s.

1539 Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. I. The Establishment of a Sound Production Welding Technique. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication*, v. 25, Oct. 1957, p. 397-402.

Recommendations for avoiding porosity defects and reducing transverse cracking defects.

1540* "Heavyweight" Fabrication Costs Sliced With Unionmelt, New Unionarc Welding. Howard E. Jackson. *Western Metals*, v. 15, Oct. 1957, p. 52-54.

How one fabricator speeds heavy welding jobs with semiautomatic metal arc and submerged arc processes.

1541* (Slovakian.) Contribution to the Problems of Brass Weldability. **Príspevok k problematike zvaritel'nosti mosadzi.** Viktor Országh. *Zváranie*, v. 6, no. 9, Sept. 1957, p. 265-270.

Classification of brass from the viewpoint of weldability. Factors affecting weldability of standard-type brass. Comparison of brass weldability in flame welding and in argon-shielded arc welding with a non-consumable electrode.

See also: **582** (arc welding automation); **619** (process in electric arcs); **970** (stress corrosion of steel welds); **1052** (cracking of steel welds); **1086** (strength of welded joints); **1089** (welding of Type 347 steels); **1151** (segregation and diffusion in the freezing of welds); **1152** (weld structures); **1330** (welding of nuclear fuel elements).

MISCELLANEOUS

1542* (German.) A New Method for Determining the Instantaneous Quantity of Material Conveyed by the Air Stream in Pneumatic Conveying. **Neues Verfahren zur Bestimmung der augenblicklich geförderten Gutmengen im Luftstrom bei pneumatischer-Förderung.** W. Barth, R. Nagel, and K. van Waveren. *Chemie-Ingenieur-Technik*, v. 29, Sept. 1957, p. 599-602.

1543 Safety in the Chemical Industry. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 1727-1754.

Integration of safety principles into a development program; safety program for hazardous catalysts and catalyst initiators; venting dust explosions; monitoring of solvent-air mixtures with infra-red analyzers; barricading hazardous reactions; standards for laboratory sample cylinders; safe practices for handling compressed gases.

1544 Random Numbers Aren't Nonsense. W. J. Youden. *Industrial and Engineering Chemistry*, v. 49, Oct. 1957, p. 89A-90A.

Used in statistical design for sampling and to obtain empirical solutions to difficult problems.

1545* Labor and Automation. Ted F. Silvey. *ISA Journal*, v. 4, Oct. 1957, p. 468-471.

Reviews problems brought about by automation; suggests methods needed to aid employees and management in transition periods.

1546* A Numerical Study of Dedekind's Cubic Class Number Formula. Harvey Cohn. *Journal of Research, National Bureau of Standards*, v. 59, Oct. 1957, p. 265-271.

Formula is used to compute class numbers for a sample of pure cubic fields, employing the SEAC computer.

1547* Some Operational Methods in the Calculus of Finite Differences. Joseph Talacko. *Mathematics Magazine*, v. 31, Sept.-Oct. 1957, p. 15-25.

Introduces a general operator, which possesses the distributive, commutative, and associated properties as a generalization of calculus of symbols.

1548* The New Military and Naval Dictionary. Frank Gaynor, editor. 295 p. 1951. Philosophical Library, New York. (U24 G25n)

A comprehensive and up-to-date definitive glossary covering all branches of the armed forces: Air Force, Army, Navy, Marine Corps, Cost Guard, and Civil Defense. Over 7000 terms are defined.

1549 Recent Developments in Traffic Noise Control. David C. Apps. *Noise Control*, v. 3, Sept. 1957, p. 34 + 3 pages.

Concludes that quiet mufflers are easily obtained and that they must be installed on vehicular trucks.

1550 Safety and Fire Protection. X. How to Organize a Safety Program. J. L. Risinger. *Petroleum Refiner*, v. 36, Oct. 1957, p. 237-239.

(To be continued.)

1551* Atmospheres in Which We Live—Safe or Dangerous? A. Z. Mample. *Western Union Technical Review*, v. 11, Oct. 1957, p. 152-163.

Method and apparatus for determining the presence of explosive gases or gaseous vapors in enclosed atmospheres.